# WoLLIC 2005 Problem

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I found the problem when I was looking for a unique syntactical representation for propositional theories to be used in Belief Change operations. This led me the Prime Implicants/Implicates representation and from there to the observation that they can be classified in equivalence classes if we ignore the specific identities and signs of the propositional symbols. But how many are them? 221.

The reason why there are 221 Prime Implicants/Implicates pairs and 400 theories is that among the 74 theories with 8 models, 42 are symmetrical, i.e., their PI and IP forms are syntactically equivallent. Therefore, the number of theories is:

$$1+4+6+19+27+50+56+74+56+50+27+19+6+4+1=400$$

and the number of PIP pairs is:

$$1+4+6+19+27+50+56+58=221$$

where $58=74-16$, 16 being the number of asymmetric theories.

## 1 Preliminaries

Let $P=\{p_1,\ldots,p_n\}$ be a set of propositional symbols and $LIT=\{L_1,\ldots,L_{2n}\}$ the set of their associated literals, where $L_i=p_j$ or $L_i=\neg p_j$. A *clause* $C$ is a *disjunction* [2] of literals: $C=L_1\vee\cdots\vee L_{k_C}$ and a *dual clause*, or *term*, is a *conjunction* of literals: $D=L_1\wedge\cdots\wedge L_{k_D}$.

Given a propositional logic language $\mathcal{L}(P)$ and an *ordinary formula* $\psi\in\mathcal{L}(P)$, there are algorithms for converting it into a *conjunctive normal form (CNF)* and into a *disjunctive normal form (DNF)* (e.g., [6], [8], [9]). The CNF is defined as a conjunction of clauses, $CNF_\psi=C_1\wedge\cdots\wedge C_m$, and the DNF as a disjunction of terms, $DNF_\psi=D_1\vee\cdots\vee D_w$, such that $\psi\Leftrightarrow CNF_\psi\Leftrightarrow DNF_\psi$.

A clause $C$ is an *implicate* [3, 4, 5] of a formula $\psi$ iff $\psi\models C$, and it is a *prime implicate* iff for all implicates $C'$ of $\psi$ such that $C'\models C$, we have $C\models C'$, or syntactically [7], for all literals $L\in C$, $\psi\not\models(C-\{L\})$. We define $PI_\psi$ as the conjunction of all prime implicates of $\psi$, clearly $\psi\Leftrightarrow PI_\psi$. This normal form is also known as *complete CNF*.

A term $D$ is an *implicant* of a formula $\psi$ iff $D\models\psi$, and it is a *prime implicant* iff for all implicants $D'$ of $\psi$ such that $D\models D'$, we have $D'\models D$, or syntactically, for all literals $L\in D$, $(D-\{L\})\not\models\psi$. We define $IP_\psi$ as the disjunction of all prime implicants of $\psi$, again $\psi\Leftrightarrow IP_\psi$. This normal form is also known as *complete DNF* or *Blake canonical form*.

In propositional logic, implicates and implicants are dual notions, in particular, an algorithm that calculates one of them can also be used to calculate the other [9].

Alternatively, prime implicates and implicants can be defined as special cases of CNF (or DNF) formulas, that consist of the smallest sets of clauses (or terms) closed for inference, without any subsumed clauses (or terms), and not containing a literal and its negation. In the sequel, conjunctions and disjunctions of literals, clauses and terms are treated as sets.

## 2 Quantum Notation

Given a formula $\psi$, represented by a conjunctive normal form $CNF_\psi$ and by a disjunctive normal form $DNF_\psi$, we introduce the concept of a *conjunctive quantum*, defined as a pair $(L,F_c)$, where $L$ is a literal that occurs in $\psi$ and $F_c\subseteq CNF_\psi$ is its set of *conjunctive coordinates* that contains the subset of clauses in $CNF_\psi$ to which literal $L$ belongs.

A quantum is noted $L^F$. Dually, we define a *disjunctive quantum* as a pair $(L, F_d)$, where $L$ is a literal that occurs in $\psi$ and $F_d \subseteq DNF_\psi$ is its set of *disjunctive coordinates* that contains the subset of terms in $DNF_\psi$ to which literal $L$ belongs. The rationale behind the choice of the name *quantum* is to emphasize that we are not interested in an isolated literal, but that our *minimal* unit of interest is the literal and its situation with respect to the theory in which it occurs.

**Example 1** *Consider the theory $\psi$ given by the following CNF:*

$$\begin{array}{l} 0 : (p_0 \vee p_1 \vee \neg p_3) \wedge \\ 1 : (\neg p_0 \vee \neg p_1 \vee p_3) \wedge \\ 2 : (p_0 \vee \neg p_1 \vee \neg p_2) \wedge \\ 3 : (p_0 \vee \neg p_1 \vee p_2) \wedge \\ 4 : (\neg p_0 \vee p_1 \vee p_2) \end{array}$$

*The literals that occur in $\psi$ can be represented by the following set of conjunctive quanta:* [1]

$$\{p_0^{\{0,2,3\}}, \neg p_0^{\{1,4\}}, p_1^{\{0,4\}}, \neg p_1^{\{1,2,3\}}, p_2^{\{3,4\}}, \neg p_2^{\{2\}}, p_3^{\{1\}}, \neg p_3^{\{0\}}\}$$

The quantum notation can be used to characterize $PI_\psi$ and $IP_\psi$ of a formula $\psi$, given, respectively, by one $CNF_\psi$ and one $DNF_\psi$. Let $D = L_1 \wedge \cdots \wedge L_k$ be a term represented by a set of conjunctive quanta, $L_1^{F_c^1} \wedge \cdots \wedge L_k^{F_c^k}$. $D$ is an implicant of $\psi$ if $\cup_{i=1}^k F_c^i = CNF_\psi$ and $L_i \not\Leftrightarrow \neg L_j, i, j \in \{1, \ldots, k\}$, i.e., $D$ contains at least one literal that belongs to each clause in $CNF_\psi$, spanning a path through $CNF_\psi$, and no pair of contradictory literals. To be a prime implicant, a term $D$ have to satisfy a *non redundancy* condition, i.e., each of its literals should represent *alone* at least one clause in $CNF_\psi$. To define this condition, we introduce the notion of *exclusive coordinates*. Given a term $D$ and a literal $L_i \in D$, the exclusive conjunctive coordinates of $L$ in $D$, defined by $\widehat{F}_c^i = F_c^i - \cup_{j=1, j\neq i}^k F_c^j$, are the clauses in the set $F_c^i$, to which no other literal of $D$ belongs. Using this notion, the non redundancy condition can be written as: $\forall i \in \{1, \ldots, k\}, \widehat{F}_c^i \neq \emptyset$.

Dually, a clause $C = L_1 \vee \cdots \vee L_k$ represented by a set of disjunctive quanta, $L_1^{F_d^1} \vee \cdots \vee L_k^{F_d^k}$, such that $\cup_{i=1}^k F_d^i = DNF_\psi$, with no pair of tautological literals allowed, is an implicate. Again $C$ is a prime implicate if it satisfies the non redundancy condition, expressed by $\forall i \in \{1, \ldots, k\}, \widehat{F}_d^i \neq \emptyset$, where $\widehat{F}_d^i = F_d^i - \cup_{j=1, j\neq i}^k F_d^j$ is the set of exclusive disjunctive coordinates of $L_i$ in $C$.

**Example 2** *Consider the theory $\psi$ introduced in example 1. The set:*

$$D = \{p_0^{\{0,2,3\}}, p_1^{\{0,4\}}, \neg p_2^{\{2\}}, p_3^{\{1\}}\}$$

*is an implicant of $\psi$ because the union of the conjunctive coordinates associated with its quanta is equal to the set of clauses in $CNF_\psi$. The exclusive conjunctive coordinates of the quanta in $D$ are given by: $p_0^{\{3\}}, p_1^{\{4\}}, \neg p_2^{\{\}}, p_3^{\{1\}}$. The fact that $\neg p_2$ has empty exclusive coordinates indicate that $D$ is not a prime implicant. In fact, the prime implicats of theory $\psi$ are the following terms, where the exclusive conjunctive coordinates are in boldface:*

$$\begin{array}{l} 0 : (p_0^{\{\mathbf{0},\mathbf{2},3\}} \wedge p_2^{\{3,\mathbf{4}\}} \wedge p_3^{\{\mathbf{1}\}}) \vee \\ 1 : (p_0^{\{0,\mathbf{2},\mathbf{3}\}} \wedge p_1^{\{0,\mathbf{4}\}} \wedge p_3^{\{\mathbf{1}\}}) \vee \\ 2 : (p_0^{\{\mathbf{0},2,3\}} \wedge \neg p_1^{\{\mathbf{1},2,3\}} \wedge p_2^{\{3,\mathbf{4}\}}) \vee \\ 3 : (\neg p_0^{\{1,\mathbf{4}\}} \wedge \neg p_1^{\{1,\mathbf{2},\mathbf{3}\}} \wedge \neg p_3^{\{\mathbf{0}\}}) \vee \\ 4 : (\neg p_1^{\{\mathbf{1},\mathbf{2},3\}} \wedge p_2^{\{3,\mathbf{4}\}} \wedge \neg p_3^{\{\mathbf{0}\}}) \end{array}$$

Given a theory $\psi$, it is possible to determine the sets of conjunctive and disjunctive quanta that, respectively, define $IP_\psi$ with respect to $PI_\psi$ and $PI_\psi$ with respect to $IP_\psi$. This minimal quantum notation is an enriched representation for prime implicates and implicants sets, in the sense that it explicitly contains the "holographic" relation between literals in one form and the clauses (or terms) in which they occur in the other form.

[1] To simplify the notation, the sets of conjunctive coordinates contain the clause numbers instead of the clauses themselves.

# 3 Prime Form Properties

We choose to use *prime normal forms* for knowledge representation in the scope of *Belief Change* domain because of the following properties of these normal forms:

1. The prime form representations are unique (up to the order of the clauses and terms and of the literals that occur in them).
2. Given both prime representations of a given formula $\psi$, the prime representations of its negation can be obtained directly:[2] $PI_{\neg\psi} = \overline{IP_\psi}, IP_{\neg\psi} = \overline{PI_\psi}$.
3. The prime implicates and implicants of a proposition, can be queried in polynomial time for consistency, validity, clause entailment, implicants, equivalence, sentential entailment and model enumeration [1].
4. Prime implicates and implicants of a proposition present a holographic relation, where each literal in a clause is associated with a dual clause and conversely. This allows the identification of which dual clauses are "critically" affected by a given clause.

The first and most important property – the uniqueness of the prime representations – deserves more comments. The prime representations in $PIP$ are unique in the sense that, given a set $P$ of propositional symbols, any proposition build up with symbols of $P$ has one and only one representation in $PIP$, but the structure of the any pair in $PIP$ depends only on the *relations* between the propositional symbols and not on their identity with respect to the set $P$. Therefore, each pair represents a whole *family* of structurally identical propositions, equivalent with respect to the group of permutations and complementations.

We conjecture that, given a $PIP$ pair, the family to which it belongs can be identified simply by the the cardinality of the sets of coordinates and exclusive coordinates of its quanta. More formally, given a propositional symbol $p$ and a $PIP$ pair where it occurs, the situation of $p$ with respect to the pair can be characterized by its coordinate and exclusive coordinates sets: $F_c, \widehat{F_c}, F_d, \widehat{F_d}$. We claim that this situation can also be described by four simpler multisets, where only the cardinalities of the coordinates are taken into account. Two are concerned with the $PI$:

$$\{|\, \widehat{F_d} \,|\, |\, p^{F_d} \in C \in F_c\} \qquad \{|\, \widehat{F_d} \,|\, |\, \neg p^{F_d} \in C \in F_c\}$$

and two with the $IP$:

$$\{|\, \widehat{F_c} \,|\, |\, p^{F_d} \in D \in F_d\} \qquad \{|\, \widehat{F_c} \,|\, |\, \neg p^{F_d} \in D \in F_d\}$$

These cardinalities can also be used to identify "symmetrical" propositional symbols, because symmetrical symbols have all the coordinate sets of equal cardinality.

# 4 Experiment

To test this conjecture we developed a program that classify the propositions according to these cardinalities and then test whether the members of each class are indeed equivalent and whether those of different classes are not.

The program also calculates the total number of theories to compare with the number of families. Let $P = \{p_1, p_2, \ldots, p_n\}$, there are $2^n$ different truth value assignments for these $n$ symbols. Any proposition build up with symbols in $P$ will be true in some subset of these $2^n$ assignments, therefore the number of non trivial propositions is given by[3]:

$$2 \sum_{i=1}^{2^{n-1}} C_i^{2^n}$$

Table 1 shows the number of propositions and the number of $PIP$ pairs obtained for $2 \leq n \leq 5$.

[2] We note $\overline{A}$ the formula $A$ with the truth values of all its literals flipped.

[3] The propositions with more than $\frac{2^n}{2}$ models are equivalent to the negations of the propositions with less than $\frac{2^n}{2} = 2^{n-1}$ models.

| $n$ | | $C_1^{2^n}$ | $C_2^{2^n}$ | $C_3^{2^n}$ | $C_4^{2^n}$ | $C_5^{2^n}$ | $C_6^{2^n}$ | $C_7^{2^n}$ | $C_8^{2^n}$ | ⋮ | $\sum$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | *all* | 4 | 6 | | | | | | | ⋮ | 10 |
| | *pip* | 1 | 2 | | | | | | | ⋮ | 3 |
| 3 | *all* | 8 | 28 | 56 | 70 | | | | | ⋮ | 163 |
| | *pip* | 1 | 3 | 3 | 6 | | | | | ⋮ | 13 |
| 4 | *all* | 16 | 120 | 560 | 1820 | 4368 | 8008 | 11440 | 12870 | ⋮ | 39202 |
| | *pip* | 1 | 4 | 6 | 19 | 27 | 50 | 56 | 58 | ⋮ | 221 |
| 5 | *all* | 32 | 496 | 4960 | 35960 | ⋯ | ⋯ | ⋯ | ⋯ | ⋮ | 2448023842 |
| | *pip* | 1 | 5 | 10 | 47 | ⋯ | ⋯ | ⋯ | ⋯ | ⋮ | ⋯ |

Table 1: Number of Propositions.

## References


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## A Geometrical Representation

The $PIP$ pairs can be represented geometrically. Consider a $n$-dimensional space ($n =\mid P \mid$), where each dimension consists of a triplet $(-1, 0, 1)$ and is associated with a particular propositional symbol. Each point in this space (except the origin) can represent a clause or a term: the point $(x_1, \ldots, x_n)$ represents a clause that contains $p_i$ if $x_i = 1$, contains $\neg p_i$ if $x_i = -1$ and does not contain neither $p_i$ nor $\neg p_i$, if $x_i = 0$. Polya's solution of the problem uses this representation, except that he applied it only to models (points with no $x_i = 0$).

Any theory in CNF or in DNF can be represented using this geometrical representation (except those that contain tautological clauses or contradictory terms because, by definition, they can not be represented geometrically), but the pairs in $PIP$ must respect strong restrictions associated with the necessary properties of prime forms defined in Section 1:

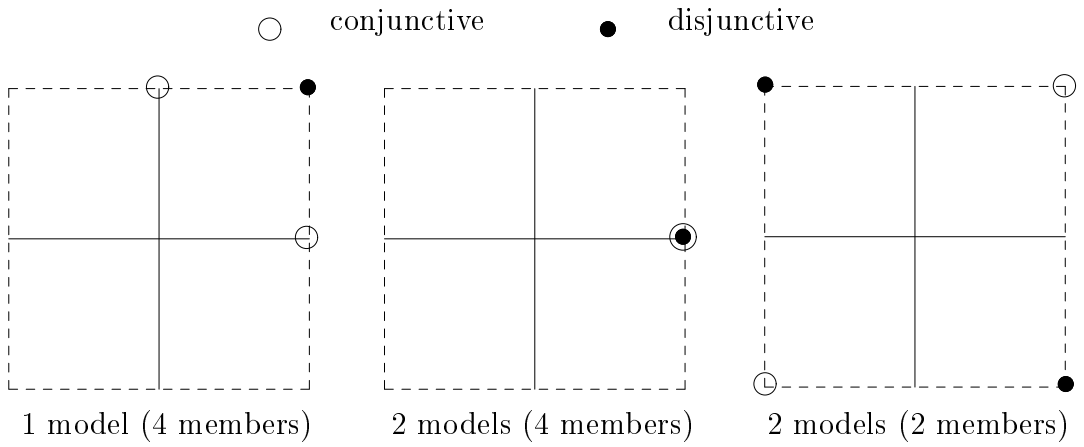


Figure 1: 2-Dimensional Theories.

- Inference closure: if two points – $(x_1, \ldots, x_{i-1}, 1, x_{i+1}, \ldots, x_n)$ and $(x'_1, \ldots, x'_{i-1}, -1, x'_{i+1}, \ldots, x'_n)$ – that represent either clauses or terms belong to a $PIP$ pair, then the point:

  $$(x_1, \ldots, x_{i-1}, x_{i+1}, \ldots, x_n, x'_1, \ldots, x'_{i-1}, x'_{i+1}, \ldots, x'_n)$$

  also belongs to the $PIP$ pair or is subsumed by lower dimension point.

- Subsumption: if the point $(x_1, \ldots, x_{i-1}, 0, x_{i+1}, \ldots, x_n)$ belongs to a $PIP$ pair, then no point:

  $$(x_1, \ldots, x_{i-1}, x_i, x_{i+1}, \ldots, x_n)$$

  with $x_i \neq 0$, belongs to the $PIP$ pair.

- Duality: if $(x_1, \ldots, x_n)$ represents a clause, then all points that represent terms in the same $PIP$ pair must lie in one or more hyperplanes defined by the coordinates $x_i \neq 0$.

Figures 1 and 2 show the geometrical representation of some 2 and 3 propositional symbols theories.

# B All 221 PIP pairs with 4 Propositional Symbols

The quantum syntactical representations of all PIP pairs with 4 propositional symbols theories are the following.

## B.1 Notation

- $p_i^F$ : the literal $p_i$ has coordinates $L$, i.e., it occurs in the (dual) clauses $L$ in the dual representation.
- Asym/Sym : the 42 symmetrical theories, i.e., those that have syntactically equivallent PI and IP forms, are market Sym.
- $n$ symbols : the theory has $n$ propositional symbols.
- $n$ literals : the theory has $n$ literals in both forms.
- pures : propositional symbols that appear with only one signal in the theory.
- symm syms : the propositional symbols in the same group are symmetrical, i.e., they have the same coordinates.
- Conj Res/Disj Res $(n \times m : k)$ : (dual) clause $k$ is the resolvent of (dual) cluases $n$ and $m$.

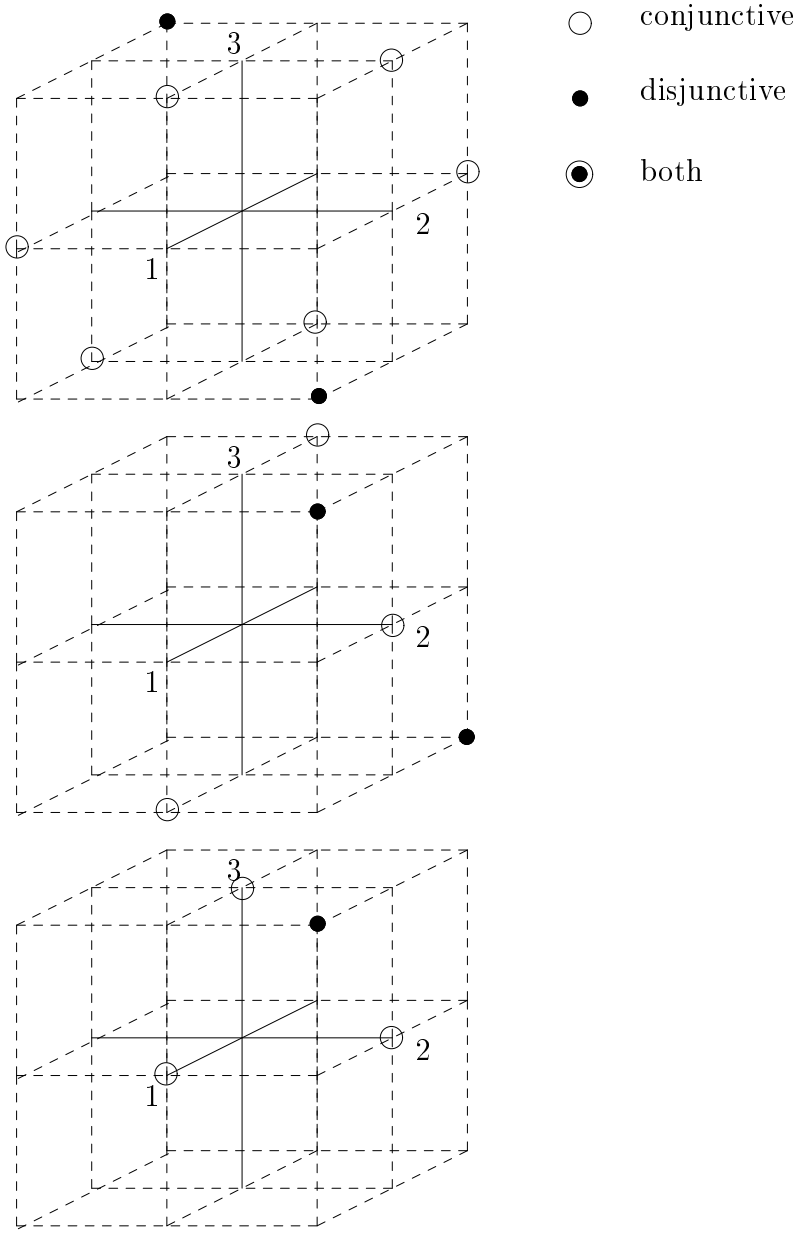


Figure 2: 3-Dimensional Theories.

## B.2 Theories

### 1 model 1 theory

$$\left(\begin{array}{ll} 0:[\neg p_1^{\{0\}}] & \\ 1:[\neg p_2^{\{0\}}] & 0:\langle \neg p_1^{\{0\}}, \neg p_2^{\{1\}}, \neg p_3^{\{2\}}, \neg p_4^{\{3\}} \rangle \\ 2:[\neg p_3^{\{0\}}] & \\ 3:[\neg p_4^{\{0\}}] & \end{array}\right)$$

1 : Asym, 4 symbols, 8 literals, pures : $p_1, p_2, p_3, p_4$, symm syms : $(p_1, p_2, p_3, p_4)$

### 2 models 4 theories

$$\left(\begin{array}{ll} 0:[\neg p_1^{\{0\}}] & \\ 1:[\neg p_2^{\{0\}}] & 0:\langle \neg p_1^{\{0\}}, \neg p_2^{\{1\}}, \neg p_3^{\{2\}} \rangle \\ 2:[\neg p_3^{\{0\}}] & \end{array}\right)$$

2 : Asym, 3 symbols, 6 literals, pures : $p_1, p_2, p_3$, symm syms : $(p_1, p_2, p_3)$

$$\left(\begin{array}{ll} 0:[p_3^{\{0\}}, p_4^{\{1\}}] & \\ 1:[\neg p_3^{\{1\}}, \neg p_4^{\{0\}}] & 0:\langle \neg p_1^{\{2\}}, \neg p_2^{\{3\}}, p_3^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 2:[\neg p_1^{\{0,1\}}] & 1:\langle \neg p_1^{\{2\}}, \neg p_2^{\{3\}}, \neg p_3^{\{1\}}, p_4^{\{0\}} \rangle \\ 3:[\neg p_2^{\{0,1\}}] & \end{array}\right)$$

3 : Asym, 4 symbols, 14 literals, pures : $p_1, p_2$, symm syms : $(p_1, p_2)(p_4, p_3)$

$$\left(\begin{array}{ll} 0:[p_2^{\{0\}}, p_4^{\{1\}}] & \\ 1:[p_2^{\{0\}}, p_3^{\{1\}}] & \\ 2:[\neg p_2^{\{1\}}, \neg p_3^{\{0\}}] & \\ 3:[\neg p_3^{\{0\}}, p_4^{\{1\}}] & 0:\langle \neg p_1^{\{6\}}, p_2^{\{0,1\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{4,5\}} \rangle \\ 4:[\neg p_2^{\{1\}}, \neg p_4^{\{0\}}] & 1:\langle \neg p_1^{\{6\}}, \neg p_2^{\{2,4\}}, p_3^{\{1,5\}}, p_4^{\{0,3\}} \rangle \\ 5:[p_3^{\{1\}}, \neg p_4^{\{0\}}] & \\ 6:[\neg p_1^{\{0,1\}}] & \end{array}\right)$$

4 : Asym, 4 symbols, 21 literals, pures : $p_1$, symm syms : $(p_4, p_2, p_3)$
Conj Res : 5x2:4, 3x4:2, 1x4:5, 1x3:0, 0x2:3, 0x5:1

$$\left(\begin{array}{ll} 0:[\neg p_2^{\{0\}}, p_4^{\{1\}}] & \\ 1:[\neg p_2^{\{0\}}, p_3^{\{1\}}] & \\ 2:[\neg p_1^{\{1\}}, \neg p_2^{\{0\}}] & \\ 3:[p_3^{\{1\}}, \neg p_4^{\{0\}}] & \\ 4:[p_2^{\{1\}}, \neg p_4^{\{0\}}] & \\ 5:[\neg p_1^{\{1\}}, \neg p_4^{\{0\}}] & 0:\langle p_1^{\{9,10,11\}}, \neg p_2^{\{0,1,2\}}, \neg p_3^{\{6,7,8\}}, \neg p_4^{\{3,4,5\}} \rangle \\ 6:[\neg p_3^{\{0\}}, p_4^{\{1\}}] & 1:\langle \neg p_1^{\{2,5,8\}}, p_2^{\{4,7,11\}}, p_3^{\{1,3,10\}}, p_4^{\{0,6,9\}} \rangle \\ 7:[p_2^{\{1\}}, \neg p_3^{\{0\}}] & \\ 8:[\neg p_1^{\{1\}}, \neg p_3^{\{0\}}] & \\ 9:[p_1^{\{0\}}, p_4^{\{1\}}] & \\ 10:[p_1^{\{0\}}, p_3^{\{1\}}] & \\ 11:[p_1^{\{0\}}, p_2^{\{1\}}] & \end{array}\right)$$

5 : Asym, 4 symbols, 32 literals, symm syms : $(p_2, p_4, p_3, p_1)$
Conj Res : 11x0:9, 11x1:10, 11x5:4, 11x8:7, 10x6:9, 10x7:11, 10x2:1, 10x5:3, 9x3:10, 9x4:11, 9x2:0, 9x8:6, 7x0:6, 7x2:8, 6x4:7, 6x5:8, 4x1:3, 4x2:5, 3x7:4, 3x8:5, 1x6:0, 1x8:2, 0x3:1, 0x5:2

### 3 models 6 theories

$$\left(\begin{array}{ll} 0:[\neg p_3^{\{1\}}, \neg p_4^{\{0\}}] & 0:\langle \neg p_1^{\{1\}}, \neg p_2^{\{2\}}, \neg p_4^{\{0\}}\rangle \\ 1:[\neg p_1^{\{0,1\}}] & 1:\langle \neg p_1^{\{1\}}, \neg p_2^{\{2\}}, \neg p_3^{\{0\}}\rangle \\ 2:[\neg p_2^{\{0,1\}}] & \end{array}\right)$$

6 : Asym, 4 symbols, 10 literals, pures : $p_3, p_4, p_1, p_2$, symm syms : $(p_1, p_2)(p_3, p_4)$

$$\left(\begin{array}{ll} 0:[\neg p_2^{\{0\}}, \neg p_4^{\{1\}}] & \\ 1:[\neg p_2^{\{0\}}, \neg p_3^{\{1\}}] & 0:\langle \neg p_1^{\{4\}}, \neg p_2^{\{0,1\}}, p_3^{\{2\}}, p_4^{\{3\}}\rangle \\ 2:[p_3^{\{0\}}, \neg p_4^{\{1\}}] & 1:\langle \neg p_1^{\{4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,2\}}\rangle \\ 3:[\neg p_3^{\{1\}}, p_4^{\{0\}}] & \\ 4:[\neg p_1^{\{0,1\}}] & \end{array}\right)$$

7 : Asym, 4 symbols, 16 literals, pures : $p_2, p_1$, symm syms : $(p_4, p_3)$
Conj Res : 3x0:1, 2x1:0

$$\left(\begin{array}{ll} 0:[p_2^{\{2\}}, p_3^{\{0\}}, p_4^{\{1\}}] & \\ 1:[\neg p_2^{\{0,1\}}, \neg p_3^{\{1,2\}}] & 0:\langle \neg p_1^{\{4\}}, \neg p_2^{\{1,3\}}, p_3^{\{0\}}, \neg p_4^{\{2,3\}}\rangle \\ 2:[\neg p_3^{\{1,2\}}, \neg p_4^{\{0,2\}}] & 1:\langle \neg p_1^{\{4\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}}, p_4^{\{0\}}\rangle \\ 3:[\neg p_2^{\{0,1\}}, \neg p_4^{\{0,2\}}] & 2:\langle \neg p_1^{\{4\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{2,3\}}\rangle \\ 4:[\neg p_1^{\{0,1,2\}}] & \end{array}\right)$$

8 : Asym, 4 symbols, 22 literals, pures : $p_1$, symm syms : $(p_4, p_2, p_3)$

$$\left(\begin{array}{ll} 0:[\neg p_2^{\{1\}}, p_3^{\{0\}}] & \\ 1:[\neg p_2^{\{1\}}, p_4^{\{0\}}] & \\ 2:[\neg p_1^{\{0\}}, \neg p_2^{\{1\}}] & \\ 3:[\neg p_3^{\{1\}}, p_4^{\{0\}}] & \\ 4:[p_2^{\{0\}}, \neg p_3^{\{1\}}] & 0:\langle \neg p_1^{\{2,5,8\}}, p_2^{\{4,7\}}, p_3^{\{0,6\}}, p_4^{\{1,3\}}\rangle \\ 5:[\neg p_1^{\{0\}}, \neg p_3^{\{1\}}] & 1:\langle \neg p_2^{\{0,1,2\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{6,7,8\}}\rangle \\ 6:[p_3^{\{0\}}, \neg p_4^{\{1\}}] & \\ 7:[p_2^{\{0\}}, \neg p_4^{\{1\}}] & \\ 8:[\neg p_1^{\{0\}}, \neg p_4^{\{1\}}] & \end{array}\right)$$

9 : Asym, 4 symbols, 25 literals, pures : $p_1$, symm syms : $(p_3, p_2, p_4)$
Conj Res : 7x0:6, 7x2:8, 6x4:7, 6x5:8, 4x1:3, 4x2:5, 3x7:4, 3x8:5, 1x6:0, 1x8:2, 0x3:1, 0x5:2

$$\left(\begin{array}{ll} 0:[\neg p_2^{\{1,2\}}, p_3^{\{0\}}] & \\ 1:[p_2^{\{0\}}, \neg p_3^{\{1,2\}}] & \\ 2:[p_1^{\{1\}}, p_4^{\{0,2\}}] & \\ 3:[\neg p_3^{\{1,2\}}, p_4^{\{0,2\}}] & 0:\langle \neg p_1^{\{5,6,7\}}, p_2^{\{1\}}, p_3^{\{0\}}, p_4^{\{2,3,4\}}\rangle \\ 4:[\neg p_2^{\{1,2\}}, p_4^{\{0,2\}}] & 1:\langle p_1^{\{2\}}, \neg p_2^{\{0,4,7\}}, \neg p_3^{\{1,3,6\}}, \neg p_4^{\{5\}}\rangle \\ 5:[\neg p_1^{\{0,2\}}, \neg p_4^{\{1\}}] & 2:\langle \neg p_1^{\{5,6,7\}}, \neg p_2^{\{0,4,7\}}, \neg p_3^{\{1,3,6\}}, p_4^{\{2,3,4\}}\rangle \\ 6:[\neg p_1^{\{0,2\}}, \neg p_3^{\{1,2\}}] & \\ 7:[\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2\}}] & \end{array}\right)$$

10 : Asym, 4 symbols, 28 literals, symm syms : $(p_3, p_2, p_1, p_4)$
Conj Res : 4x5:7, 3x5:6, 2x6:3, 2x7:4, 1x4:3, 1x7:6, 0x3:4, 0x6:7

$$\left(\begin{array}{ll}
0 : [p_1^{\{0\}}, p_2^{\{1\}}, p_4^{\{2\}}] & \\
1 : [p_1^{\{0\}}, p_2^{\{1\}}, p_3^{\{2\}}] & \\
2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & \\
3 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,1\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,5,8\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{6,7,8\}} \rangle \\
4 : [\neg p_3^{\{0,1\}}, p_4^{\{2\}}] & 1 : \langle \neg p_1^{\{2,3,6\}}, p_2^{\{0,1\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{6,7,8\}} \rangle \\
5 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3,6\}}, \neg p_2^{\{2,5,8\}}, p_3^{\{1,7\}}, p_4^{\{0,4\}} \rangle \\
6 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0,1\}}] & \\
7 : [p_3^{\{2\}}, \neg p_4^{\{0,1\}}] & \\
8 : [\neg p_2^{\{0,2\}}, \neg p_4^{\{0,1\}}] &
\end{array}\right)$$

11 : Asym, 4 symbols, 32 literals, symm syms : $(p_4, p_3)(p_1, p_2)$
Conj Res : 7x3:6, 7x5:8, 4x6:3, 4x8:5, 1x4:0, 0x7:1

## 4 models 19 theories

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0\}}] & 0 : \langle \neg p_1^{\{0\}}, \neg p_2^{\{1\}} \rangle \\
1 : [\neg p_2^{\{0\}}] &
\end{array}\right)$$

12 : Asym, 2 symbols, 4 literals, pures : $p_1, p_2$, symm syms : $(p_1, p_2)$

$$\left(\begin{array}{ll}
0 : [p_2^{\{0\}}, p_3^{\{1\}}] & 0 : \langle \neg p_1^{\{2\}}, p_2^{\{0\}}, \neg p_3^{\{1\}} \rangle \\
1 : [\neg p_2^{\{1\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{2\}}, \neg p_2^{\{1\}}, p_3^{\{0\}} \rangle \\
2 : [\neg p_1^{\{0,1\}}] &
\end{array}\right)$$

13 : Asym, 3 symbols, 11 literals, pures : $p_1$, symm syms : $(p_3, p_2)$

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0,1\}}, \neg p_3^{\{1,2\}}] & 0 : \langle \neg p_1^{\{3\}}, \neg p_2^{\{0,2\}}, \neg p_4^{\{1,2\}} \rangle \\
1 : [\neg p_3^{\{1,2\}}, \neg p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{3\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{0,1\}} \rangle \\
2 : [\neg p_2^{\{0,1\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_1^{\{3\}}, \neg p_3^{\{0,1\}}, \neg p_4^{\{1,2\}} \rangle \\
3 : [\neg p_1^{\{0,1,2\}}] &
\end{array}\right)$$

14 : Asym, 4 symbols, 16 literals, pures : $p_3, p_2, p_4, p_1$, symm syms : $(p_3, p_2, p_4)$

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{1,2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}} \rangle \\
1 : [\neg p_3^{\{0,2\}}, p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{3\}}, \neg p_2^{\{0,2\}}, p_4^{\{1\}} \rangle \\
2 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{0,2\}}] & 2 : \langle \neg p_1^{\{3\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{1,2\}} \rangle \\
3 : [\neg p_1^{\{0,1,2\}}] &
\end{array}\right)$$

15 : Asym, 4 symbols, 16 literals, pures : $p_2, p_3, p_1$, symm syms : $(p_2, p_3)$
Conj Res : 1x0:2
Disj Res : 1x0:2

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{1,2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{3\}}, p_2^{\{2\}}, \neg p_3^{\{1\}}, \neg p_4^{\{0\}} \rangle \\
1 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{3\}}, \neg p_2^{\{0,1\}}, p_3^{\{2\}} \rangle \\
2 : [p_2^{\{0\}}, p_3^{\{1\}}, p_4^{\{2\}}] & 2 : \langle \neg p_1^{\{3\}}, \neg p_2^{\{0,1\}}, p_4^{\{2\}} \rangle \\
3 : [\neg p_1^{\{0,1,2\}}] &
\end{array}\right)$$

16 : Asym, 4 symbols, 18 literals, pures : $p_1$, symm syms : $(p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0\}}, p_3^{\{1\}}] & \\ 1 : [\neg p_1^{\{1\}}, \neg p_2^{\{0\}}] & \\ 2 : [p_2^{\{1\}}, \neg p_3^{\{0\}}] & 0 : \langle p_1^{\{4,5\}}, \neg p_2^{\{0,1\}}, \neg p_3^{\{2,3\}} \rangle \\ 3 : [\neg p_1^{\{1\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{1,3\}}, p_2^{\{2,5\}}, p_3^{\{0,4\}} \rangle \\ 4 : [p_1^{\{0\}}, p_3^{\{1\}}] & \\ 5 : [p_1^{\{0\}}, p_2^{\{1\}}] & \end{array}\right)$$

17 : Asym, 3 symbols, 18 literals, symm syms : $(p_2, p_3, p_1)$
Conj Res : 5x0:4, 5x3:2, 4x2:5, 4x1:0, 2x1:3, 0x3:1

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0\}}, p_3^{\{1\}}] & \\ 1 : [\neg p_2^{\{0\}}, p_4^{\{1\}}] & \\ 2 : [\neg p_1^{\{1\}}, \neg p_2^{\{0\}}] & 0 : \langle \neg p_2^{\{0,1,2\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{5,6\}} \rangle \\ 3 : [\neg p_3^{\{0\}}, p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{2,4,6\}}, p_3^{\{0,5\}}, p_4^{\{1,3\}} \rangle \\ 4 : [\neg p_1^{\{1\}}, \neg p_3^{\{0\}}] & \\ 5 : [p_3^{\{1\}}, \neg p_4^{\{0\}}] & \\ 6 : [\neg p_1^{\{1\}}, \neg p_4^{\{0\}}] & \end{array}\right)$$

18 : Asym, 4 symbols, 20 literals, pures : $p_2, p_1$, symm syms : $(p_3, p_4)(p_2, p_1)$
Conj Res : 5x4:6, 3x6:4, 1x5:0, 1x6:2, 0x3:1, 0x4:2

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{0,2\}}] & \\ 1 : [\neg p_3^{\{1,2\}}, p_4^{\{0\}}] & \\ 2 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{1,2\}}] & 0 : \langle \neg p_1^{\{0,2,4\}}, \neg p_2^{\{0,3,6\}}, p_3^{\{5\}}, p_4^{\{1\}} \rangle \\ 3 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{1,2\}}] & 1 : \langle \neg p_1^{\{0,2,4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{4,5,6\}} \rangle \\ 4 : [\neg p_1^{\{0,1\}}, \neg p_4^{\{1,2\}}] & 2 : \langle \neg p_2^{\{0,3,6\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{4,5,6\}} \rangle \\ 5 : [p_3^{\{0\}}, \neg p_4^{\{1,2\}}] & \\ 6 : [\neg p_2^{\{0,2\}}, \neg p_4^{\{1,2\}}] & \end{array}\right)$$

19 : Asym, 4 symbols, 24 literals, pures : $p_2, p_1$, symm syms : $(p_4, p_3)(p_2, p_1)$
Conj Res : 5x2:4, 5x3:6, 1x4:2, 1x6:3

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,2\}}, \neg p_4^{\{1\}}] & \\ 1 : [\neg p_2^{\{1,2\}}, p_3^{\{0\}}] & \\ 2 : [\neg p_2^{\{1,2\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{0,3,6\}}, p_2^{\{5\}}, p_3^{\{1\}}, p_4^{\{2,4\}} \rangle \\ 3 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2\}}] & 1 : \langle \neg p_2^{\{1,2,3\}}, \neg p_3^{\{4,5,6\}}, \neg p_4^{\{0\}} \rangle \\ 4 : [\neg p_3^{\{1,2\}}, p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{0,3,6\}}, \neg p_2^{\{1,2,3\}}, \neg p_3^{\{4,5,6\}} \rangle \\ 5 : [p_2^{\{0\}}, \neg p_3^{\{1,2\}}] & \\ 6 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{1,2\}}] & \end{array}\right)$$

20 : Asym, 4 symbols, 24 literals, pures : $p_1$, symm syms : $(p_3, p_2)$
Conj Res : 5x2:4, 5x3:6, 4x0:6, 2x0:3, 1x4:2, 1x6:3

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,3\}}] & 0 : \langle \neg p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{2\}}, p_4^{\{3\}} \rangle \\ 1 : [p_1^{\{1,3\}}, p_2^{\{0,2\}}] & 1 : \langle p_1^{\{1\}}, \neg p_2^{\{0\}}, \neg p_3^{\{2\}}, p_4^{\{3\}} \rangle \\ 2 : [\neg p_3^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{0\}}, p_2^{\{1\}}, p_3^{\{3\}}, \neg p_4^{\{2\}} \rangle \\ 3 : [p_3^{\{2,3\}}, p_4^{\{0,1\}}] & 3 : \langle p_1^{\{1\}}, \neg p_2^{\{0\}}, p_3^{\{3\}}, \neg p_4^{\{2\}} \rangle \end{array}\right)$$

21 : Asym, 4 symbols, 24 literals, symm syms : $(p_2, p_1, p_3, p_4)$

$$\left(\begin{array}{ll} 0 : [\neg p_3^{\{0,2\}}, p_4^{\{1\}}] & \\ 1 : [p_1^{\{0\}}, p_2^{\{2\}}, p_4^{\{1\}}] & \\ 2 : [\neg p_2^{\{0,1\}}, \neg p_4^{\{0,2\}}] & 0 : \langle p_1^{\{1\}}, \neg p_2^{\{2,3,6\}}, \neg p_3^{\{0,3,5\}}, \neg p_4^{\{2,4\}} \rangle \\ 3 : [\neg p_2^{\{0,1\}}, \neg p_3^{\{0,2\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{2,3,6\}}, p_4^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{1\}}, \neg p_3^{\{0,3,5\}}, \neg p_4^{\{2,4\}} \rangle \\ 5 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,2\}}] & \\ 6 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,1\}}] & \end{array}\right)$$

22 : Asym, 4 symbols, 26 literals, pures : $p_3$, symm syms : $(p_2, p_1)$
Conj Res : 0x2:3, 0x4:5

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{2\}}, p_3^{\{1\}}] & \\ 1 : [p_1^{\{0\}}, p_2^{\{2\}}, p_4^{\{1\}}] & \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2\}}, \neg p_3^{\{5,6\}}, \neg p_4^{\{3,4\}} \rangle \\ 3 : [p_3^{\{1\}}, \neg p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{2,4,6\}}, p_3^{\{0,3\}}, p_4^{\{1,5\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_1^{\{2,4,6\}}, p_2^{\{0,1\}}, \neg p_3^{\{5,6\}}, \neg p_4^{\{3,4\}} \rangle \\ 5 : [\neg p_3^{\{0,2\}}, p_4^{\{1\}}] & \\ 6 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,2\}}] & \end{array}\right)$$

23 : Asym, 4 symbols, 27 literals, symm syms : $(p_3, p_4)$
Conj Res : 5x4:6, 3x6:4, 1x3:0, 0x5:1

$$\left(\begin{array}{ll} 0 : [p_2^{\{1\}}, p_3^{\{2\}}, \neg p_4^{\{0\}}] & \\ 1 : [p_1^{\{0\}}, p_2^{\{1\}}, p_3^{\{2\}}] & \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0\}}] & \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 0 : \langle p_1^{\{1,6\}}, \neg p_2^{\{4,7\}}, \neg p_3^{\{2,5\}}, \neg p_4^{\{0,3\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0,1\}}, p_4^{\{5,6,7\}} \rangle \\ 5 : [\neg p_3^{\{0\}}, p_4^{\{1,2\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0,1\}}, p_4^{\{5,6,7\}} \rangle \\ 6 : [p_1^{\{0\}}, p_4^{\{1,2\}}] & \\ 7 : [\neg p_2^{\{0\}}, p_4^{\{1,2\}}] & \end{array}\right)$$

24 : Asym, 4 symbols, 28 literals, symm syms : $(p_4, p_1)(p_3, p_2)$
Conj Res : 7x3:4, 6x0:1, 6x2:5, 6x4:7, 5x3:2, 1x3:0

$$\left(\begin{array}{ll} 0 : [p_2^{\{0,3\}}, p_3^{\{1,3\}}, \neg p_4^{\{2,3\}}] & 0 : \langle \neg p_1^{\{4\}}, p_2^{\{0,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}} \rangle \\ 1 : [\neg p_2^{\{1,2\}}, p_3^{\{1,3\}}, p_4^{\{0,1\}}] & 1 : \langle \neg p_1^{\{4\}}, \neg p_2^{\{1,2\}}, p_3^{\{0,1\}}, p_4^{\{1,3\}} \rangle \\ 2 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{4\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0,2\}} \rangle \\ 3 : [p_2^{\{0,3\}}, \neg p_3^{\{0,2\}}, p_4^{\{0,1\}}] & 3 : \langle \neg p_1^{\{4\}}, p_2^{\{0,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{0,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2,3\}}] & \end{array}\right)$$

25 : Asym, 4 symbols, 29 literals, pures : $p_1$, symm syms : $(p_4, p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{2\}}, p_3^{\{1\}}, p_4^{\{0\}}] & \\ 1 : [p_2^{\{0\}}, p_3^{\{1\}}, \neg p_4^{\{2\}}] & \\ 2 : [p_1^{\{2\}}, p_2^{\{0\}}, p_3^{\{1\}}] & \\ 3 : [\neg p_2^{\{1,2\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{5,6,7\}}, p_2^{\{1,2\}}, \neg p_3^{\{4,5\}}, p_4^{\{0,3\}} \rangle \\ 4 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{0,2\}}] & 1 : \langle \neg p_1^{\{5,6,7\}}, \neg p_2^{\{3,4,7\}}, p_3^{\{0,1,2\}} \rangle \\ 5 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{0,2\}}] & 2 : \langle p_1^{\{0,2\}}, \neg p_2^{\{3,4,7\}}, \neg p_3^{\{4,5\}}, \neg p_4^{\{1,6\}} \rangle \\ 6 : [\neg p_1^{\{0,1\}}, \neg p_4^{\{2\}}] & \\ 7 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{1,2\}}] & \end{array}\right)$$

26 : Asym, 4 symbols, 30 literals, symm syms : $(p_1, p_2)$
Conj Res : 3x6:7, 2x3:0, 2x6:1, 0x1:2

$$\left(\begin{array}{ll}
0 : [p_1^{\{2\}}, p_2^{\{1\}}, p_3^{\{3\}}, p_4^{\{0\}}] & \\
1 : [\neg p_2^{\{0,2,3\}}, \neg p_4^{\{1,2,3\}}] & \\
2 : [\neg p_3^{\{0,1,2\}}, \neg p_4^{\{1,2,3\}}] & 0 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{1,3,6\}}, \neg p_3^{\{2,3,5\}}, p_4^{\{0\}} \rangle \\
3 : [\neg p_2^{\{0,2,3\}}, \neg p_3^{\{0,1,2\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0\}}, \neg p_3^{\{2,3,5\}}, \neg p_4^{\{1,2,4\}} \rangle \\
4 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{1,2,3\}}] & 2 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3,6\}}, \neg p_3^{\{2,3,5\}}, \neg p_4^{\{1,2,4\}} \rangle \\
5 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{0,1,2\}}] & 3 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{1,3,6\}}, p_3^{\{0\}}, \neg p_4^{\{1,2,4\}} \rangle \\
6 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{0,2,3\}}] &
\end{array}\right)$$

27 : Asym, 4 symbols, 32 literals, symm syms : $(p_4, p_1, p_3, p_2)$

$$\left(\begin{array}{ll}
0 : [p_2^{\{0\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,2\}}] & \\
1 : [p_1^{\{2\}}, p_3^{\{0,1\}}, p_4^{\{0,3\}}] & \\
2 : [\neg p_2^{\{1,2,3\}}, p_3^{\{0,1\}}] & 0 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0\}}, p_3^{\{1,2\}}, p_4^{\{1,3\}} \rangle \\
3 : [\neg p_2^{\{1,2,3\}}, p_4^{\{0,3\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{2,3,6\}}, p_3^{\{1,2\}}, \neg p_4^{\{0,4\}} \rangle \\
4 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{1,2\}}] & 2 : \langle p_1^{\{1\}}, \neg p_2^{\{2,3,6\}}, \neg p_3^{\{0,5\}}, \neg p_4^{\{0,4\}} \rangle \\
5 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{2,3\}}] & 3 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{2,3,6\}}, \neg p_3^{\{0,5\}}, p_4^{\{1,3\}} \rangle \\
6 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{1,2,3\}}] &
\end{array}\right)$$

28 : Asym, 4 symbols, 32 literals, symm syms : $(p_3, p_4)(p_2, p_1)$
Conj Res : 3x4:6, 2x5:6

$$\left(\begin{array}{ll}
0 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_4^{\{2,3\}}] & \\
1 : [p_2^{\{1,2\}}, \neg p_3^{\{0,2\}}, p_4^{\{2,3\}}] & \\
2 : [\neg p_2^{\{0,3\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{0,1\}}] & \\
3 : [\neg p_2^{\{0,3\}}, p_3^{\{1,3\}}, p_4^{\{2,3\}}] & 0 : \langle p_1^{\{0,4,6\}}, \neg p_2^{\{2,3,7\}}, \neg p_3^{\{1,2,9\}}, \neg p_4^{\{2,5,8\}} \rangle \\
4 : [p_1^{\{0\}}, p_3^{\{1,3\}}, p_4^{\{2,3\}}] & 1 : \langle \neg p_1^{\{7,8,9\}}, p_2^{\{0,1,5,6\}}, p_3^{\{3,4,5,6\}}, \neg p_4^{\{2,5,8\}} \rangle \\
5 : [p_2^{\{1,2\}}, p_3^{\{1,3\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{7,8,9\}}, p_2^{\{0,1,5,6\}}, \neg p_3^{\{1,2,9\}}, p_4^{\{0,1,3,4\}} \rangle \\
6 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_3^{\{1,3\}}] & 3 : \langle \neg p_1^{\{7,8,9\}}, \neg p_2^{\{2,3,7\}}, p_3^{\{3,4,5,6\}}, p_4^{\{0,1,3,4\}} \rangle \\
7 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}}] & \\
8 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0,1\}}] & \\
9 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,2\}}] &
\end{array}\right)$$

29 : Asym, 4 symbols, 43 literals, symm syms : $(p_4, p_2, p_3)$
Conj Res : 6x3:4, 6x1:0, 6x8:5, 4x1:0, 4x5:6, 4x7:3, 0x3:4, 0x5:6, 0x9:1

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0,3\}}, p_3^{\{0,2\}}, \neg p_4^{\{0,1\}}] & \\
1 : [p_1^{\{0,3\}}, p_3^{\{0,2\}}, \neg p_4^{\{0,1\}}] & \\
2 : [\neg p_2^{\{0,3\}}, \neg p_3^{\{1,3\}}, p_4^{\{2,3\}}] & \\
3 : [p_1^{\{0,3\}}, \neg p_3^{\{1,3\}}, p_4^{\{2,3\}}] & 0 : \langle p_1^{\{1,3,4\}}, \neg p_2^{\{0,2,7\}}, p_3^{\{0,1,5,8\}}, \neg p_4^{\{0,1,6,9\}} \rangle \\
4 : [p_1^{\{0,3\}}, p_2^{\{1,2\}}] & 1 : \langle \neg p_1^{\{7,8,9\}}, p_2^{\{4,5,6\}}, \neg p_3^{\{2,3,6,9\}}, \neg p_4^{\{0,1,6,9\}} \rangle \\
5 : [p_2^{\{1,2\}}, p_3^{\{0,2\}}, p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{7,8,9\}}, p_2^{\{4,5,6\}}, p_3^{\{0,1,5,8\}}, p_4^{\{2,3,5,8\}} \rangle \\
6 : [p_2^{\{1,2\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,1\}}] & 3 : \langle p_1^{\{1,3,4\}}, \neg p_2^{\{0,2,7\}}, \neg p_3^{\{2,3,6,9\}}, p_4^{\{2,3,5,8\}} \rangle \\
7 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,3\}}] & \\
8 : [\neg p_1^{\{1,2\}}, p_3^{\{0,2\}}, p_4^{\{2,3\}}] & \\
9 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,1\}}] &
\end{array}\right)$$

30 : Asym, 4 symbols, 44 literals, symm syms : $(p_4, p_3)(p_2, p_1)$
Conj Res : 6x7:9, 5x7:8, 4x0:1, 4x2:3, 4x8:5, 4x9:6, 3x7:2, 1x7:0

## 5 models 27 theories

$$\left(\begin{array}{ll} 0:[\neg p_2^{\{1\}}, \neg p_4^{\{0\}}] & 0:\langle \neg p_1^{\{2\}}, \neg p_3^{\{1\}}, \neg p_4^{\{0\}}\rangle \\ 1:[\neg p_2^{\{1\}}, \neg p_3^{\{0\}}] & 1:\langle \neg p_1^{\{2\}}, \neg p_2^{\{0,1\}}\rangle \\ 2:[\neg p_1^{\{0,1\}}] & \end{array}\right)$$

31 : Asym, 4 symbols, 10 literals, pures : $p_2, p_4, p_3, p_1$, symm syms : $(p_4, p_3)$

$$\left(\begin{array}{ll} 0:[\neg p_1^{\{1\}}, \neg p_3^{\{0\}}] & \\ 1:[\neg p_1^{\{1\}}, \neg p_4^{\{0\}}] & \\ 2:[\neg p_1^{\{1\}}, \neg p_2^{\{0\}}] & 0:\langle p_1^{\{4\}}, \neg p_2^{\{2,5\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{1\}}\rangle \\ 3:[\neg p_3^{\{0\}}, p_4^{\{1\}}] & 1:\langle \neg p_1^{\{0,1,2\}}, p_4^{\{3,4,5\}}\rangle \\ 4:[p_1^{\{0\}}, p_4^{\{1\}}] & \\ 5:[\neg p_2^{\{0\}}, p_4^{\{1\}}] & \end{array}\right)$$

32 : Asym, 4 symbols, 18 literals, pures : $p_3, p_2$, symm syms : $(p_3, p_2)(p_1, p_4)$
Conj Res : 5x1:2, 4x0:3, 4x2:5, 3x1:0

$$\left(\begin{array}{ll} 0:[p_2^{\{0\}}, p_3^{\{2\}}, \neg p_4^{\{1,3\}}] & 0:\langle \neg p_1^{\{2\}}, p_2^{\{0\}}, \neg p_3^{\{1\}}\rangle \\ 1:[\neg p_2^{\{2,3\}}, \neg p_3^{\{0,1\}}] & 1:\langle \neg p_1^{\{2\}}, \neg p_3^{\{1\}}, \neg p_4^{\{0\}}\rangle \\ 2:[\neg p_1^{\{0,1,2,3\}}] & 2:\langle \neg p_1^{\{2\}}, \neg p_2^{\{1\}}, p_3^{\{0\}}\rangle \\ & 3:\langle \neg p_1^{\{2\}}, \neg p_2^{\{1\}}, \neg p_4^{\{0\}}\rangle \end{array}\right)$$

33 : Asym, 4 symbols, 18 literals, pures : $p_4, p_1$, symm syms : $(p_3, p_2)$
Disj Res : 2x1:3, 0x3:1

$$\left(\begin{array}{ll} 0:[\neg p_1^{\{1,2\}}, \neg p_2^{\{0\}}] & \\ 1:[p_3^{\{1\}}, \neg p_4^{\{0,2\}}] & 0:\langle \neg p_2^{\{0\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{1,2\}}\rangle \\ 2:[\neg p_1^{\{1,2\}}, \neg p_4^{\{0,2\}}] & 1:\langle \neg p_1^{\{0,2,4\}}, p_3^{\{1\}}, p_4^{\{3\}}\rangle \\ 3:[\neg p_3^{\{0,2\}}, p_4^{\{1\}}] & 2:\langle \neg p_1^{\{0,2,4\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{1,2\}}\rangle \\ 4:[\neg p_1^{\{1,2\}}, \neg p_3^{\{0,2\}}] & \end{array}\right)$$

34 : Asym, 4 symbols, 19 literals, pures : $p_2, p_1$, symm syms : $(p_3, p_4)$
Conj Res : 3x2:4, 1x4:2

$$\left(\begin{array}{ll} 0:[p_2^{\{1\}}, p_3^{\{2\}}, \neg p_4^{\{0\}}] & \\ 1:[\neg p_1^{\{1,2\}}, \neg p_3^{\{0\}}] & \\ 2:[\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 0:\langle \neg p_2^{\{3,5\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,2\}}\rangle \\ 3:[\neg p_1^{\{1,2\}}, \neg p_2^{\{0\}}] & 1:\langle \neg p_1^{\{1,2,3\}}, p_2^{\{0\}}, p_4^{\{4,5\}}\rangle \\ 4:[\neg p_3^{\{0\}}, p_4^{\{1,2\}}] & 2:\langle \neg p_1^{\{1,2,3\}}, p_3^{\{0\}}, p_4^{\{4,5\}}\rangle \\ 5:[\neg p_2^{\{0\}}, p_4^{\{1,2\}}] & \end{array}\right)$$

35 : Asym, 4 symbols, 22 literals, pures : $p_1$, symm syms : $(p_3, p_2)$
Conj Res : 5x2:3, 4x2:1

$$\left(\begin{array}{ll} 0:[\neg p_2^{\{1,2\}}, p_3^{\{0\}}, p_4^{\{1,3\}}] & 0:\langle \neg p_1^{\{3\}}, p_2^{\{1\}}, p_3^{\{0\}}, \neg p_4^{\{2\}}\rangle \\ 1:[p_2^{\{0\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}}] & 1:\langle \neg p_1^{\{3\}}, \neg p_2^{\{0,2\}}, p_4^{\{0,1\}}\rangle \\ 2:[\neg p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0\}}] & 2:\langle \neg p_1^{\{3\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{1,2\}}\rangle \\ 3:[\neg p_1^{\{0,1,2,3\}}] & 3:\langle \neg p_1^{\{3\}}, \neg p_3^{\{1,2\}}, p_4^{\{0,1\}}\rangle \end{array}\right)$$

36 : Asym, 4 symbols, 23 literals, pures : $p_1$, symm syms : $(p_2, p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{1\}}, p_3^{\{2\}}, \neg p_4^{\{0\}}] & \\ 1 : [p_1^{\{1\}}, p_2^{\{2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{4,5\}}, \neg p_4^{\{0,1\}} \rangle \\ 2 : [\neg p_2^{\{0,1\}}, p_3^{\{2\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{4,5\}} \rangle \\ 3 : [\neg p_1^{\{2\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{3,5\}}, p_2^{\{1,4\}}, p_3^{\{0,2\}} \rangle \\ 4 : [p_2^{\{2\}}, \neg p_3^{\{0,1\}}] & \\ 5 : [\neg p_1^{\{2\}}, \neg p_3^{\{0,1\}}] & \end{array}\right)$$

37 : Asym, 4 symbols, 23 literals, pures : $p_4$, symm syms : $(p_3, p_2)$
Conj Res : 4x3:5, 2x5:3, 1x2:0, 0x4:1

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,2,3\}}, \neg p_4^{\{1,2,3\}}] & \\ 1 : [\neg p_3^{\{0,1,2\}}, \neg p_4^{\{1,2,3\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,2,5\}}, \neg p_3^{\{1,2,4\}} \rangle \\ 2 : [\neg p_2^{\{0,2,3\}}, \neg p_3^{\{0,1,2\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,1,3\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{1,2,3\}}] & 2 : \langle \neg p_2^{\{0,2,5\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,1,3\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{0,1,2\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,2,5\}}, \neg p_4^{\{0,1,3\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{0,2,3\}}] & \end{array}\right)$$

38 : Asym, 4 symbols, 24 literals, pures : $p_2, p_4, p_3, p_1$, symm syms : $(p_2, p_4, p_3, p_1)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,2,3\}}, \neg p_4^{\{1,2\}}] & \\ 1 : [\neg p_3^{\{1,2,3\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,2,5\}}, p_4^{\{1\}} \rangle \\ 2 : [\neg p_2^{\{0,2,3\}}, \neg p_3^{\{1,2,3\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{1,2\}}] & 2 : \langle \neg p_2^{\{0,2,5\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,2,3\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,2,5\}}, \neg p_3^{\{1,2,4\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{0,2,3\}}] & \end{array}\right)$$

39 : Asym, 4 symbols, 24 literals, pures : $p_2, p_3, p_1$, symm syms : $(p_2, p_1)$
Conj Res : 1x0:2, 1x3:4
Disj Res : 0x1:3, 0x2:3

$$\left(\begin{array}{ll} 0 : [\neg p_3^{\{1,2\}}, p_4^{\{0,3\}}] & \\ 1 : [\neg p_2^{\{1,2,3\}}, p_3^{\{0\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{1\}}, p_4^{\{0,2\}} \rangle \\ 2 : [\neg p_2^{\{1,2,3\}}, p_4^{\{0,3\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, \neg p_3^{\{0,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{2\}}] & 2 : \langle \neg p_2^{\{1,2,5\}}, \neg p_3^{\{0,4\}}, \neg p_4^{\{3\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,2\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_4^{\{0,2\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{1,2,3\}}] & \end{array}\right)$$

40 : Asym, 4 symbols, 24 literals, pures : $p_2, p_1$, symm syms : $(p_4, p_3)(p_2, p_1)$
Conj Res : 2x3:5, 1x0:2, 1x4:5, 0x3:4
Disj Res : 3x2:1, 0x1:3

$$\left(\begin{array}{ll} 0 : [p_2^{\{1\}}, p_3^{\{2\}}, \neg p_4^{\{0\}}] & \\ 1 : [p_1^{\{0\}}, p_2^{\{1\}}, p_3^{\{2\}}] & 0 : \langle p_1^{\{1\}}, \neg p_2^{\{4,5\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,1\}}] & 1 : \langle \neg p_1^{\{2,3,5\}}, p_2^{\{0,1\}}, \neg p_3^{\{2,4\}} \rangle \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,5\}}, \neg p_2^{\{4,5\}}, p_3^{\{0,1\}} \rangle \\ 4 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{0,1\}}] & \\ 5 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & \end{array}\right)$$

41 : Asym, 4 symbols, 24 literals, pures : $p_4$, symm syms : $(p_3, p_2)$
Conj Res : 1x3:0

$$\left(\begin{array}{ll} 0 : [p_2^{\{0\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,2\}}] & \\ 1 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{1,2,5\}}, p_2^{\{0\}}, p_3^{\{3\}}, p_4^{\{4\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{2,3\}}] & 1 : \langle \neg p_1^{\{1,2,5\}}, \neg p_2^{\{3,4,5\}}, \neg p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_2^{\{1,2,3\}}, p_3^{\{0\}}] & 2 : \langle \neg p_2^{\{3,4,5\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{0,1\}} \rangle \\ 4 : [\neg p_2^{\{1,2,3\}}, p_4^{\{0\}}] & 3 : \langle \neg p_1^{\{1,2,5\}}, \neg p_2^{\{3,4,5\}}, \neg p_3^{\{0,2\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{1,2,3\}}] & \end{array}\right)$$

42 : Asym, 4 symbols, 26 literals, pures : $p_1$, symm syms : $(p_3, p_4)$
Conj Res : 4x1:5, 3x2:5

$$\left(\begin{array}{ll} 0 : [p_2^{\{0\}}, p_3^{\{3\}}, \neg p_4^{\{1,2\}}] & \\ 1 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{0,2\}}] & 0 : \langle \neg p_1^{\{1,2,5\}}, p_2^{\{0\}}, \neg p_3^{\{1,4\}}, p_4^{\{3\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{1,2\}}] & 1 : \langle \neg p_1^{\{1,2,5\}}, \neg p_2^{\{3,4,5\}}, \neg p_4^{\{0,2\}} \rangle \\ 3 : [\neg p_2^{\{1,2,3\}}, p_4^{\{0\}}] & 2 : \langle \neg p_2^{\{3,4,5\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,2\}} \rangle \\ 4 : [\neg p_2^{\{1,2,3\}}, \neg p_3^{\{0,2\}}] & 3 : \langle \neg p_1^{\{1,2,5\}}, \neg p_2^{\{3,4,5\}}, p_3^{\{0\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{1,2,3\}}] & \end{array}\right)$$

43 : Asym, 4 symbols, 26 literals, pures : $p_1$
Conj Res : 3x2:5
Disj Res : 3x2:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{1\}}, p_4^{\{2,3\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2\}}, p_3^{\{3\}}, \neg p_4^{\{4\}} \rangle \\ 1 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{2,3\}}] & 1 : \langle \neg p_1^{\{2\}}, p_2^{\{0,1\}}, p_3^{\{3\}}, \neg p_4^{\{4\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,3\}}] & 2 : \langle \neg p_1^{\{2\}}, \neg p_3^{\{1,4\}}, p_4^{\{0,3\}} \rangle \\ 3 : [p_3^{\{0,1\}}, p_4^{\{2,3\}}] & 3 : \langle \neg p_2^{\{2\}}, \neg p_3^{\{1,4\}}, p_4^{\{0,3\}} \rangle \\ 4 : [\neg p_3^{\{2,3\}}, \neg p_4^{\{0,1\}}] & \end{array}\right)$$

44 : Asym, 4 symbols, 26 literals, symm syms : $(p_4, p_3)(p_2, p_1)$
Conj Res : 3x1:0, 0x4:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{3\}}, p_2^{\{0\}}, p_3^{\{2\}}, p_4^{\{1\}}] & \\ 1 : [\neg p_2^{\{1,2,3\}}, \neg p_4^{\{0,3\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{1,3\}} \rangle \\ 2 : [\neg p_2^{\{1,2,3\}}, \neg p_3^{\{0,3\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_4^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_4^{\{0,3\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_3^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{0,3\}}] & 3 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2,5\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{1,3\}} \rangle \\ 5 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{1,2,3\}}] & \end{array}\right)$$

45 : Asym, 4 symbols, 28 literals, symm syms : $(p_3, p_4)(p_2, p_1)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,1\}}, p_3^{\{2\}}, \neg p_4^{\{0,3\}}] & \\ 1 : [\neg p_3^{\{0,3\}}, p_4^{\{1,2\}}] & 0 : \langle p_1^{\{2\}}, \neg p_2^{\{0,5\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,4\}} \rangle \\ 2 : [p_1^{\{0\}}, p_2^{\{3\}}, p_4^{\{1,2\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,5\}}, p_4^{\{1,2\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,3\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0\}}, p_4^{\{1,2\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0,3\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{2\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,4\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,1\}}] & \end{array}\right)$$

46 : Asym, 4 symbols, 28 literals
Conj Res : 1x4:3

$$\left(\begin{array}{ll} 0 : [p_1^{\{1\}}, p_3^{\{0\}}, \neg p_4^{\{2\}}] & \\ 1 : [p_1^{\{1\}}, p_2^{\{2\}}, p_3^{\{0\}}] & \\ 2 : [p_2^{\{2\}}, \neg p_3^{\{1\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{5,6\}}, \neg p_2^{\{4,5\}}, p_3^{\{0,1\}}, p_4^{\{2,3\}} \rangle \\ 3 : [p_1^{\{1\}}, p_2^{\{2\}}, p_4^{\{0\}}] & 1 : \langle p_1^{\{0,1,3\}}, \neg p_2^{\{4,5\}}, \neg p_3^{\{2,6\}} \rangle \\ 4 : [\neg p_2^{\{0,1\}}, \neg p_4^{\{2\}}] & 2 : \langle \neg p_1^{\{5,6\}}, p_2^{\{1,2,3\}}, \neg p_4^{\{0,4\}} \rangle \\ 5 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{0,1\}}] & \\ 6 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{1\}}] & \end{array}\right)$$

47 : Asym, 4 symbols, 28 literals, symm syms : $(p_4, p_3)(p_1, p_2)$
Conj Res : 3x0:1, 3x6:2, 1x2:3, 1x4:0

$$\left(\begin{array}{ll} 0 : [p_2^{\{3\}}, p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & \\ 1 : [p_1^{\{0\}}, p_3^{\{1,2\}}, p_4^{\{2,3\}}] & 0 : \langle p_1^{\{1,2\}}, \neg p_2^{\{3,6\}}, \neg p_3^{\{4\}}, \neg p_4^{\{0,5\}} \rangle \\ 2 : [p_1^{\{0\}}, p_2^{\{3\}}, p_3^{\{1,2\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{3,6\}}, p_3^{\{0,1,2\}} \rangle \\ 3 : [\neg p_2^{\{0,1\}}, p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{4,5,6\}}, p_3^{\{0,1,2\}}, p_4^{\{1,3\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0\}}] & 3 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0,2\}}, p_4^{\{1,3\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & \\ 6 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,1\}}] & \end{array}\right)$$

48 : Asym, 4 symbols, 30 literals, symm syms : $(p_2, p_4)$
Conj Res : 3x5:6, 2x5:0, 2x3:1, 1x0:2
Disj Res : 3x1:2

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0,2\}}] & \\ 1 : [p_2^{\{0,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}}] & \\ 2 : [\neg p_2^{\{1,2\}}, p_3^{\{0,1\}}, p_4^{\{1,3\}}] & 0 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{1,3\}}, p_3^{\{2,3\}}, \neg p_4^{\{0,3,4\}} \rangle \\ 3 : [p_2^{\{0,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{0,2,6\}}, p_3^{\{2,3\}}, p_4^{\{1,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_2^{\{0,2,6\}}, \neg p_3^{\{0,1,5\}}, \neg p_4^{\{0,3,4\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{2,3\}}] & 3 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{1,3\}}, \neg p_3^{\{0,1,5\}}, p_4^{\{1,2\}} \rangle \\ 6 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{1,2\}}] & \end{array}\right)$$

49 : Asym, 4 symbols, 33 literals, pures : $p_1$, symm syms : $(p_2, p_3, p_4)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{1\}}, p_3^{\{0\}}, p_4^{\{2,3\}}] & \\ 1 : [\neg p_2^{\{1,3\}}, p_3^{\{0\}}, p_4^{\{2,3\}}] & \\ 2 : [p_2^{\{0\}}, \neg p_3^{\{1,2\}}, p_4^{\{2,3\}}] & 0 : \langle \neg p_1^{\{5,6,7\}}, p_2^{\{2,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{4,6\}} \rangle \\ 3 : [p_1^{\{1\}}, p_2^{\{0\}}, p_4^{\{2,3\}}] & 1 : \langle p_1^{\{0,3\}}, \neg p_2^{\{1,4,7\}}, \neg p_3^{\{2,4,5\}}, \neg p_4^{\{4,6\}} \rangle \\ 4 : [\neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{5,6,7\}}, \neg p_3^{\{2,4,5\}}, p_4^{\{0,1,2,3\}} \rangle \\ 5 : [\neg p_1^{\{0,2,3\}}, \neg p_3^{\{1,2\}}] & 3 : \langle \neg p_1^{\{5,6,7\}}, \neg p_2^{\{1,4,7\}}, p_4^{\{0,1,2,3\}} \rangle \\ 6 : [\neg p_1^{\{0,2,3\}}, \neg p_4^{\{0,1\}}] & \\ 7 : [\neg p_1^{\{0,2,3\}}, \neg p_2^{\{1,3\}}] & \end{array}\right)$$

50 : Asym, 4 symbols, 35 literals, symm syms : $(p_3, p_2)$
Conj Res : 3x1:0, 3x5:2, 0x2:3, 0x7:1

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}}] & \\
1 : [p_1^{\{0,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}}] & \\
2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,3\}}] & 0 : \langle p_1^{\{1,5\}}, \neg p_2^{\{0,2\}}, p_3^{\{3,6\}}, \neg p_4^{\{4,7\}} \rangle \\
3 : [\neg p_1^{\{1,2\}}, p_3^{\{0\}}, p_4^{\{1,3\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{5,6,7\}}, p_4^{\{0,1,3,6\}} \rangle \\
4 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{5,6,7\}}, \neg p_3^{\{0,1,4,7\}} \rangle \\
5 : [p_1^{\{0,3\}}, p_2^{\{1,2\}}] & 3 : \langle p_1^{\{1,5\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{0,1,4,7\}}, p_4^{\{0,1,3,6\}} \rangle \\
6 : [p_2^{\{1,2\}}, p_3^{\{0\}}, p_4^{\{1,3\}}] & \\
7 : [p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0\}}] &
\end{array}\right)$$

51 : Asym, 4 symbols, 36 literals, symm syms : $(p_2, p_1)(p_3, p_4)$
Conj Res : 7x2:4, 6x2:3, 5x0:1, 5x3:6, 5x4:7, 1x2:0

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0,3\}}, p_4^{\{1,4\}}] & 0 : \langle \neg p_1^{\{4,5\}}, p_2^{\{1,3\}}, p_3^{\{0,5\}}, \neg p_4^{\{1,2\}} \rangle \\
1 : [p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_4^{\{0,2,3\}}] & 1 : \langle \neg p_1^{\{4,5\}}, p_2^{\{1,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,5\}} \rangle \\
2 : [\neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,2,3\}}] & 2 : \langle \neg p_1^{\{4,5\}}, \neg p_2^{\{0,4\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,2\}} \rangle \\
3 : [p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,2,4\}}] & 3 : \langle p_1^{\{1,3\}}, \neg p_2^{\{0,4\}}, p_3^{\{0,5\}}, \neg p_4^{\{1,2\}} \rangle \\
4 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{2,3,4\}}] & 4 : \langle p_1^{\{1,3\}}, \neg p_2^{\{0,4\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,5\}} \rangle \\
5 : [\neg p_1^{\{0,1,2\}}, p_3^{\{0,3\}}, p_4^{\{1,4\}}] &
\end{array}\right)$$

52 : Asym, 4 symbols, 36 literals, symm syms : $(p_3, p_4, p_2, p_1)$

$$\left(\begin{array}{ll}
0 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_4^{\{2,3\}}] & \\
1 : [p_2^{\{1,2\}}, \neg p_3^{\{0\}}, p_4^{\{2,3\}}] & \\
2 : [\neg p_2^{\{0\}}, p_3^{\{1,3\}}, p_4^{\{2,3\}}] & 0 : \langle p_1^{\{0,3,5\}}, \neg p_2^{\{2,6\}}, \neg p_3^{\{1,8\}}, \neg p_4^{\{4,7\}} \rangle \\
3 : [p_1^{\{0\}}, p_3^{\{1,3\}}, p_4^{\{2,3\}}] & 1 : \langle \neg p_1^{\{6,7,8\}}, p_2^{\{0,1,4,5\}}, p_3^{\{2,3,4,5\}} \rangle \\
4 : [p_2^{\{1,2\}}, p_3^{\{1,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{6,7,8\}}, p_2^{\{0,1,4,5\}}, p_4^{\{0,1,2,3\}} \rangle \\
5 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_3^{\{1,3\}}] & 3 : \langle \neg p_1^{\{6,7,8\}}, p_3^{\{2,3,4,5\}}, p_4^{\{0,1,2,3\}} \rangle \\
6 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0\}}] & \\
7 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & \\
8 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0\}}] &
\end{array}\right)$$

53 : Asym, 4 symbols, 37 literals, symm syms : $(p_4, p_2, p_3)$
Conj Res : 5x2:3, 5x1:0, 5x7:4, 3x1:0, 3x4:5, 3x6:2, 0x2:3, 0x4:5, 0x8:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{1\}}, p_2^{\{0,2\}}, p_4^{\{2,3\}}] & \\
1 : [p_2^{\{0,2\}}, \neg p_3^{\{1,2\}}, p_4^{\{2,3\}}] & \\
2 : [\neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{6,7\}}, p_2^{\{0,1,4\}}, p_3^{\{3,4,5\}}, \neg p_4^{\{2\}} \rangle \\
3 : [\neg p_2^{\{1,3\}}, p_3^{\{0,3\}}, p_4^{\{2,3\}}] & 1 : \langle p_1^{\{0,4,5\}}, \neg p_2^{\{2,3,7\}}, \neg p_3^{\{1,2,6\}} \rangle \\
4 : [p_1^{\{1\}}, p_2^{\{0,2\}}, p_3^{\{0,3\}}] & 2 : \langle \neg p_1^{\{6,7\}}, p_2^{\{0,1,4\}}, \neg p_3^{\{1,2,6\}}, p_4^{\{0,1,3,5\}} \rangle \\
5 : [p_1^{\{1\}}, p_3^{\{0,3\}}, p_4^{\{2,3\}}] & 3 : \langle \neg p_1^{\{6,7\}}, \neg p_2^{\{2,3,7\}}, p_3^{\{3,4,5\}}, p_4^{\{0,1,3,5\}} \rangle \\
6 : [\neg p_1^{\{0,2,3\}}, \neg p_3^{\{1,2\}}] & \\
7 : [\neg p_1^{\{0,2,3\}}, \neg p_2^{\{1,3\}}] &
\end{array}\right)$$

54 : Asym, 4 symbols, 37 literals, symm syms : $(p_2, p_3)$
Conj Res : 5x1:0, 5x7:3, 4x3:5, 4x1:0, 0x3:5, 0x6:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{3\}}, p_2^{\{0,2\}}, p_3^{\{0,4\}}, p_4^{\{0,1\}}] & \\
1 : [p_2^{\{0,2\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{2,3,4\}}] & 0 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0,1\}}, p_3^{\{0,2\}}, p_4^{\{0,3\}} \rangle \\
2 : [\neg p_2^{\{1,3,4\}}, p_3^{\{0,4\}}, \neg p_4^{\{2,3,4\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{2,3,5\}}, \neg p_3^{\{1,3,4\}}, p_4^{\{0,3\}} \rangle \\
3 : [\neg p_2^{\{1,3,4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,3,4\}}, \neg p_4^{\{1,2,6\}} \rangle \\
4 : [\neg p_1^{\{0,1,2,4\}}, \neg p_3^{\{1,2,3\}}] & 3 : \langle p_1^{\{0\}}, \neg p_2^{\{2,3,5\}}, \neg p_3^{\{1,3,4\}}, \neg p_4^{\{1,2,6\}} \rangle \\
5 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{1,3,4\}}] & 4 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{2,3,5\}}, p_3^{\{0,2\}}, \neg p_4^{\{1,2,6\}} \rangle \\
6 : [\neg p_1^{\{0,1,2,4\}}, \neg p_4^{\{2,3,4\}}] &
\end{array}\right)$$

55 : Asym, 4 symbols, 39 literals, symm syms : $(p_2, p_3, p_4)$

$$\left(\begin{array}{ll}
0 : [p_1^{\{1,3\}}, p_2^{\{0\}}, \neg p_3^{\{2,3\}}] & \\
1 : [\neg p_2^{\{1,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,3\}}] & \\
2 : [p_1^{\{1,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,3\}}] & \\
3 : [p_2^{\{0\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{7,8,9\}}, p_2^{\{0,3,4\}}, p_3^{\{5,6,8\}}, p_4^{\{1,2,8\}} \rangle \\
4 : [p_1^{\{1,3\}}, p_2^{\{0\}}, \neg p_4^{\{1,2\}}] & 1 : \langle p_1^{\{0,2,4,6\}}, \neg p_2^{\{1,5,7\}}, p_3^{\{5,6,8\}}, \neg p_4^{\{3,4,5,6,9\}} \rangle \\
5 : [\neg p_2^{\{1,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,2\}}] & 2 : \langle \neg p_1^{\{7,8,9\}}, \neg p_3^{\{0,1,2,3,9\}}, \neg p_4^{\{3,4,5,6,9\}} \rangle \\
6 : [p_1^{\{1,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,2\}}] & 3 : \langle p_1^{\{0,2,4,6\}}, \neg p_2^{\{1,5,7\}}, \neg p_3^{\{0,1,2,3,9\}}, p_4^{\{1,2,8\}} \rangle \\
7 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,3\}}] & \\
8 : [\neg p_1^{\{0,2\}}, p_3^{\{0,1\}}, p_4^{\{0,3\}}] & \\
9 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,2\}}] &
\end{array}\right)$$

56 : Asym, 4 symbols, 44 literals, symm syms : $(p_3, p_4)$
Conj Res : 6x0:4, 6x3:4, 6x7:5, 4x5:6, 4x9:3, 3x7:9, 2x3:0, 2x4:0, 2x7:1, 0x1:2, 0x9:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,3\}}, p_2^{\{0,4\}}, p_3^{\{0,1\}}, p_4^{\{0,2\}}] & \\
1 : [\neg p_1^{\{0,3\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,3,4\}}] & \\
2 : [p_2^{\{0,4\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,3,4\}}] & \\
3 : [\neg p_2^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,2\}}] & \\
4 : [\neg p_1^{\{0,3\}}, \neg p_2^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}] & 0 : \langle \neg p_1^{\{0,1,4,6\}}, p_2^{\{0,2,11,12\}}, p_3^{\{0,5,9,10\}}, p_4^{\{0,3,7,8\}} \rangle \\
5 : [\neg p_2^{\{1,2,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,3,4\}}] & 1 : \langle p_1^{\{7,8,9,10,11,12\}}, \neg p_2^{\{3,4,5,6,8,9\}}, p_3^{\{0,5,9,10\}}, \neg p_4^{\{1,2,5,6,10,12\}} \rangle \\
6 : [\neg p_1^{\{0,3\}}, \neg p_2^{\{1,2,3\}}, \neg p_4^{\{1,3,4\}}] & 2 : \langle p_1^{\{7,8,9,10,11,12\}}, \neg p_2^{\{3,4,5,6,8,9\}}, \neg p_3^{\{1,2,3,4,7,11\}}, p_4^{\{0,3,7,8\}} \rangle \\
7 : [p_1^{\{1,2,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,2\}}] & 3 : \langle \neg p_1^{\{0,1,4,6\}}, \neg p_2^{\{3,4,5,6,8,9\}}, \neg p_3^{\{1,2,3,4,7,11\}}, \neg p_4^{\{1,2,5,6,10,12\}} \rangle \\
8 : [p_1^{\{1,2,4\}}, \neg p_2^{\{1,2,3\}}, p_4^{\{0,2\}}] & 4 : \langle p_1^{\{7,8,9,10,11,12\}}, p_2^{\{0,2,11,12\}}, \neg p_3^{\{1,2,3,4,7,11\}}, \neg p_4^{\{1,2,5,6,10,12\}} \rangle \\
9 : [p_1^{\{1,2,4\}}, \neg p_2^{\{1,2,3\}}, p_3^{\{0,1\}}] & \\
10 : [p_1^{\{1,2,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,3,4\}}] & \\
11 : [p_1^{\{1,2,4\}}, p_2^{\{0,4\}}, \neg p_3^{\{2,3,4\}}] & \\
12 : [p_1^{\{1,2,4\}}, p_2^{\{0,4\}}, \neg p_4^{\{1,3,4\}}] &
\end{array}\right)$$

57 : Asym, 4 symbols, 60 literals, symm syms : $(p_3, p_1, p_2, p_4)$
Conj Res : 12x1:2, 12x5:10, 12x9:10, 11x1:2, 11x3:7, 11x8:7, 10x6:5, 10x2:12, 10x11:12, 9x6:5, 9x3:8, 9x7:8, 8x4:3, 8x5:9, 8x10:9, 7x4:3, 7x2:11, 7x12:11, 5x1:6, 5x4:6, 3x1:4, 3x6:4, 2x4:1, 2x6:1

## 6 models 50 theories

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{1\}}, \neg p_3^{\{0\}}] & 0 : \langle \neg p_1^{\{1\}}, \neg p_3^{\{0\}} \rangle \\
1 : [\neg p_1^{\{0,1\}}] & 1 : \langle \neg p_1^{\{1\}}, \neg p_2^{\{0\}} \rangle
\end{array}\right)$$

58 : Asym, 3 symbols, 7 literals, pures : $p_2, p_3, p_1$, symm syms : $(p_2, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1\}}, p_3^{\{0\}}] & \\ 1 : [\neg p_1^{\{0\}}, \neg p_2^{\{1\}}] & 0 : \langle \neg p_1^{\{1,3\}}, p_2^{\{2\}}, p_3^{\{0\}} \rangle \\ 2 : [p_2^{\{0\}}, \neg p_3^{\{1\}}] & 1 : \langle \neg p_2^{\{0,1\}}, \neg p_3^{\{2,3\}} \rangle \\ 3 : [\neg p_1^{\{0\}}, \neg p_3^{\{1\}}] & \end{array}\right)$$

59 : Asym, 3 symbols, 13 literals, pures : $p_1$, symm syms : $(p_3, p_2)$
Conj Res : 2x1:3, 0x3:1

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2\}}, \neg p_3^{\{1\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{2\}}, p_3^{\{1\}}, \neg p_4^{\{0\}} \rangle \\ 1 : [\neg p_2^{\{2\}}, p_3^{\{0\}}, p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{2\}}, \neg p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}] & 2 : \langle \neg p_1^{\{2\}}, \neg p_2^{\{0,1\}} \rangle \end{array}\right)$$

60 : Asym, 4 symbols, 15 literals, pures : $p_2, p_1$, symm syms : $(p_3, p_4)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1,2\}}, \neg p_4^{\{0,2\}}] & \\ 1 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{0,2\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,2\}} \rangle \\ 2 : [\neg p_1^{\{0,1\}}, \neg p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{0,2\}}] & 2 : \langle \neg p_2^{\{0,1,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{1,2\}}] & \end{array}\right)$$

61 : Asym, 4 symbols, 18 literals, pures : $p_4, p_2, p_3, p_1$, symm syms : $(p_4, p_3)(p_2, p_1)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1,2\}}, p_4^{\{0\}}] & \\ 1 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{0,2\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1\}}, \neg p_4^{\{2\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{0,2\}}] & 2 : \langle \neg p_2^{\{0,1,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{2\}} \rangle \\ 4 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{1,2\}}] & \end{array}\right)$$

62 : Asym, 4 symbols, 18 literals, pures : $p_2, p_3, p_1$, symm syms : $(p_2, p_1)$
Conj Res : 0x2:4

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1,2\}}, p_3^{\{0\}}] & \\ 1 : [\neg p_2^{\{1,2\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1\}}, \neg p_4^{\{2\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{2\}}] & 2 : \langle \neg p_2^{\{0,1,4\}}, \neg p_3^{\{3\}}, \neg p_4^{\{2\}} \rangle \\ 4 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{1,2\}}] & \end{array}\right)$$

63 : Asym, 4 symbols, 18 literals, pures : $p_2, p_1$, symm syms : $(p_2, p_1)(p_3, p_4)$
Conj Res : 1x2:4, 0x3:4

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & \\ 1 : [\neg p_2^{\{0,2\}}, p_4^{\{1\}}] & 0 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & 1 : \langle \neg p_1^{\{0,2,4\}}, p_4^{\{1,3\}} \rangle \\ 3 : [\neg p_3^{\{0,2\}}, p_4^{\{1\}}] & 2 : \langle \neg p_1^{\{0,2,4\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{3,4\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,2\}}] & \end{array}\right)$$

64 : Asym, 4 symbols, 18 literals, pures : $p_1, p_2, p_3$, symm syms : $(p_2, p_3)$
Conj Res : 3x0:4, 1x0:2
Disj Res : 1x0:2

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,3\}}] & 0 : \langle \neg p_1^{\{0\}}, \neg p_3^{\{2\}}, p_4^{\{1\}} \rangle \\ 1 : [p_3^{\{2,3\}}, p_4^{\{0,1\}}] & 1 : \langle \neg p_2^{\{0\}}, \neg p_3^{\{2\}}, p_4^{\{1\}} \rangle \\ 2 : [\neg p_3^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{0\}}, p_3^{\{1\}}, \neg p_4^{\{2\}} \rangle \\ & 3 : \langle \neg p_2^{\{0\}}, p_3^{\{1\}}, \neg p_4^{\{2\}} \rangle \end{array}\right)$$

65 : Asym, 4 symbols, 18 literals, pures : $p_2, p_1$, symm syms : $(p_2, p_1)(p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{1\}}, p_3^{\{2\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{2,3\}} \rangle \\ 1 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & 1 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0\}}, \neg p_3^{\{2,3\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,1\}}] & 2 : \langle \neg p_1^{\{1,2\}}, \neg p_2^{\{1,3\}}, p_3^{\{0\}} \rangle \\ 3 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{0,1\}}] & \end{array}\right)$$

66 : Asym, 3 symbols, 18 literals, symm syms : $(p_1, p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_3^{\{2\}}, p_4^{\{1\}}] & \\ 1 : [\neg p_2^{\{0,2\}}, p_4^{\{1\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{2\}}, \neg p_4^{\{3\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & \end{array}\right)$$

67 : Asym, 4 symbols, 20 literals, pures : $p_2$
Conj Res : 1x3:4

$$\left(\begin{array}{ll} 0 : [p_1^{\{3\}}, p_2^{\{0\}}, p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{2,4\}}, p_2^{\{0,1\}}, \neg p_4^{\{3\}} \rangle \\ 1 : [p_2^{\{0\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,2\}}] & 1 : \langle \neg p_1^{\{2,4\}}, \neg p_2^{\{3,4\}}, p_4^{\{0,1\}} \rangle \\ 2 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{2,3\}}] & 2 : \langle \neg p_2^{\{3,4\}}, \neg p_3^{\{1,2\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_2^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 3 : \langle p_1^{\{0\}}, \neg p_2^{\{3,4\}}, \neg p_3^{\{1,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{1,2,3\}}] & \end{array}\right)$$

68 : Asym, 4 symbols, 24 literals, pures : $p_3$, symm syms : $(p_1, p_4)$
Conj Res : 0x2:1
Disj Res : 3x1:2

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{2\}}, p_3^{\{3\}}, p_4^{\{1\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{3,4\}} \rangle \\ 1 : [\neg p_2^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 1 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{3,4\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,4\}}, p_2^{\{0\}}, \neg p_4^{\{1,3\}} \rangle \\ 3 : [\neg p_3^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 3 : \langle \neg p_1^{\{2,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,3\}} \rangle \\ 4 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{0,1\}}] & \end{array}\right)$$

69 : Asym, 4 symbols, 24 literals, symm syms : $(p_3, p_1, p_4, p_2)$

$$\left(\begin{array}{ll} 0 : [p_2^{\{3\}}, \neg p_3^{\{0,1\}}, \neg p_4^{\{2\}}] & 0 : \langle p_1^{\{4\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{0,1\}} \rangle \\ 1 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{0,1\}}] & 1 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{0,1\}}, p_4^{\{4\}} \rangle \\ 2 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{1,2\}}, p_3^{\{3,4\}}, \neg p_4^{\{0\}} \rangle \\ 3 : [\neg p_2^{\{0,1\}}, p_3^{\{2,3\}}] & 3 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0\}}, p_3^{\{3,4\}} \rangle \\ 4 : [p_1^{\{0\}}, p_3^{\{2,3\}}, p_4^{\{1\}}] & \end{array}\right)$$

70 : Asym, 4 symbols, 24 literals, symm syms : $(p_2, p_1)$
Conj Res : 3x1:2

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2\}}, \neg p_3^{\{1\}}, p_4^{\{0\}} \rangle \\ 0 : [p_2^{\{1,3\}}, p_3^{\{2,4\}}, p_4^{\{0,5\}}] & 1 : \langle \neg p_1^{\{2\}}, p_2^{\{0\}}, \neg p_3^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{4,5\}}, \neg p_3^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{2\}}, p_3^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3,4,5\}}] & 3 : \langle \neg p_1^{\{2\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ & 4 : \langle \neg p_1^{\{2\}}, \neg p_2^{\{1\}}, p_3^{\{0\}} \rangle \\ & 5 : \langle \neg p_1^{\{2\}}, \neg p_2^{\{1\}}, p_4^{\{0\}} \rangle \end{array}\right)$$

71 : Asym, 4 symbols, 25 literals, pures : $p_1$, symm syms : $(p_3, p_2, p_4)$
Disj Res : 5x2:4, 4x0:5, 3x4:2, 2x1:3, 1x5:0, 0x3:1

$$\left(\begin{array}{ll} 0 : [p_2^{\{2\}}, p_3^{\{0\}}, p_4^{\{1\}}] & \\ 1 : [\neg p_1^{\{2\}}, p_3^{\{0\}}, p_4^{\{1\}}] & \\ 2 : [p_2^{\{2\}}, \neg p_3^{\{1\}}, \neg p_4^{\{0\}}] & 0 : \langle p_1^{\{4\}}, \neg p_2^{\{5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,3\}} \rangle \\ 3 : [\neg p_1^{\{2\}}, \neg p_3^{\{1\}}, \neg p_4^{\{0\}}] & 1 : \langle p_1^{\{4\}}, \neg p_2^{\{5\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,1\}} \rangle \\ 4 : [p_1^{\{0,1\}}, p_2^{\{2\}}] & 2 : \langle \neg p_1^{\{1,3,5\}}, p_2^{\{0,2,4\}} \rangle \\ 5 : [\neg p_1^{\{2\}}, \neg p_2^{\{0,1\}}] & \end{array}\right)$$

72 : Asym, 4 symbols, 26 literals, symm syms : $(p_4, p_3)(p_2, p_1)$
Conj Res : 4x1:0, 4x3:2, 2x5:3, 0x5:1

$$\left(\begin{array}{ll} 0 : [p_2^{\{1\}}, p_3^{\{3\}}, \neg p_4^{\{0,2,4\}}] & 0 : \langle \neg p_2^{\{1,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}} \rangle \\ 1 : [\neg p_2^{\{0,3,4\}}, \neg p_3^{\{0,1,2\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{0,1,2\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_4^{\{0,2,4\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,3,4\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle \end{array}\right)$$

73 : Asym, 4 symbols, 26 literals, pures : $p_4, p_1$, symm syms : $(p_3, p_2)$
Disj Res : 3x0:4, 3x2:4, 1x0:2, 1x4:2

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,2,4\}}, p_3^{\{3\}}, \neg p_4^{\{0,1\}}] & 0 : \langle \neg p_2^{\{0,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}} \rangle \\ 1 : [\neg p_3^{\{0,1,2\}}, p_4^{\{3,4\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{0,1,2\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,4\}}, \neg p_3^{\{1,2\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_4^{\{0,1\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,2,4\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,4\}}, p_4^{\{1\}} \rangle \end{array}\right)$$

74 : Asym, 4 symbols, 26 literals, pures : $p_2, p_1$
Conj Res : 1x3:2
Disj Res : 4x0:2, 4x1:2, 3x2:4

$$\left(\begin{array}{ll} 0 : [p_2^{\{4\}}, p_3^{\{2,3\}}, \neg p_4^{\{0,1\}}] & 0 : \langle \neg p_2^{\{1,4\}}, \neg p_3^{\{2\}}, \neg p_4^{\{0,3\}} \rangle \\ 1 : [\neg p_2^{\{0,1,2\}}, p_4^{\{3,4\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_4^{\{0,1\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,1,2\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, p_4^{\{1\}} \rangle \end{array}\right)$$

75 : Asym, 4 symbols, 26 literals, pures : $p_1$
Conj Res : 1x3:4
Disj Res : 4x2:3, 3x1:2, 2x0:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{1\}}, p_3^{\{0\}}, p_4^{\{2\}}] & \\ 1 : [\neg p_2^{\{1\}}, p_3^{\{0\}}, p_4^{\{2\}}] & \\ 2 : [p_2^{\{0\}}, \neg p_3^{\{1\}}, p_4^{\{2\}}] & 0 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{2,3\}}, p_3^{\{0,1\}} \rangle \\ 3 : [p_1^{\{1\}}, p_2^{\{0\}}, p_4^{\{2\}}] & 1 : \langle p_1^{\{0,3\}}, \neg p_2^{\{1,6\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{5\}} \rangle \\ 4 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{1\}}] & 2 : \langle \neg p_1^{\{4,5,6\}}, p_4^{\{0,1,2,3\}} \rangle \\ 5 : [\neg p_1^{\{0,2\}}, \neg p_4^{\{1\}}] & \\ 6 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1\}}] & \end{array}\right)$$

76 : Asym, 4 symbols, 27 literals, symm syms : $(p_3, p_2)$
Conj Res : 3x1:0, 3x4:2, 0x2:3, 0x6:1

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0\}}, p_3^{\{2,3\}}, p_4^{\{1,2\}}] & \\ 1 : [p_2^{\{1,3\}}, \neg p_3^{\{0\}}, p_4^{\{1,2\}}] & 0 : \langle \neg p_2^{\{0,5\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{2,4\}} \rangle \\ 2 : [p_2^{\{1,3\}}, p_3^{\{2,3\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,2\}}, p_4^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_3^{\{0,2\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0\}}] & \end{array}\right)$$

77 : Asym, 4 symbols, 27 literals, pures : $p_1$, symm syms : $(p_3, p_2, p_4)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{2\}}, p_3^{\{4\}}, p_4^{\{1,3\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{3\}} \rangle \\ 1 : [\neg p_2^{\{0,3,4\}}, \neg p_3^{\{0,1,2\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,2\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{0,1,2\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_4^{\{0\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_4^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,3,4\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \end{array}\right)$$

78 : Asym, 4 symbols, 28 literals, symm syms : $(p_2, p_3)$
Disj Res : 4x1:3, 2x3:1

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,1,4\}}, \neg p_2^{\{2,3,4\}}] & 0 : \langle \neg p_1^{\{0,1\}}, p_2^{\{2\}}, \neg p_4^{\{3,4\}} \rangle \\ 1 : [\neg p_1^{\{0,1,4\}}, \neg p_3^{\{1,2,3\}}] & 1 : \langle \neg p_1^{\{0,1\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{3,4\}} \rangle \\ 2 : [p_2^{\{0\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{4\}}] & 2 : \langle \neg p_2^{\{0,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{3,4\}} \rangle \\ 3 : [\neg p_2^{\{2,3,4\}}, \neg p_4^{\{0,1,2\}}] & 3 : \langle p_1^{\{4\}}, \neg p_2^{\{0,3\}}, \neg p_3^{\{1,2\}} \rangle \\ 4 : [p_1^{\{3\}}, p_3^{\{4\}}, \neg p_4^{\{0,1,2\}}] & 4 : \langle \neg p_1^{\{0,1\}}, \neg p_2^{\{0,3\}}, p_3^{\{4\}}, p_4^{\{2\}} \rangle \end{array}\right)$$

79 : Asym, 4 symbols, 28 literals, symm syms : $(p_3, p_4)(p_1, p_2)$
Disj Res : 3x1:2, 0x2:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{1,2\}}, \neg p_3^{\{2,3\}}, p_4^{\{0\}}] & \\ 1 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_2^{\{4,5\}}, p_4^{\{0,1\}} \rangle \\ 2 : [\neg p_1^{\{0,3\}}, \neg p_2^{\{1,2\}}] & 1 : \langle p_1^{\{0,4\}}, \neg p_2^{\{1,2\}}, \neg p_4^{\{3,5\}} \rangle \\ 3 : [\neg p_1^{\{0,3\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1\}}] & 2 : \langle p_1^{\{0,4\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{0,1,3,5\}} \rangle \\ 4 : [p_1^{\{1,2\}}, p_2^{\{0,3\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_2^{\{4,5\}}, \neg p_3^{\{0,1,3,5\}} \rangle \\ 5 : [p_2^{\{0,3\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1\}}] & \end{array}\right)$$

80 : Asym, 4 symbols, 28 literals, pures : $p_3$, symm syms : $(p_1, p_2)$
Conj Res : 5x2:3, 4x3:5, 4x1:0, 0x2:1

$$\left(\begin{array}{ll}
0 : [p_2^{\{2,3\}}, \neg p_3^{\{0\}}, \neg p_4^{\{1\}}] & \\
1 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{0\}}, \neg p_4^{\{1\}}] & 0 : \langle p_1^{\{4,5\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{0,1\}} \rangle \\
2 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 1 : \langle p_1^{\{4,5\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{0,1\}} \rangle \\
3 : [\neg p_2^{\{0,1\}}, p_3^{\{2\}}, p_4^{\{3\}}] & 2 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0,4\}}, p_3^{\{3,5\}} \rangle \\
4 : [p_1^{\{0,1\}}, p_2^{\{2,3\}}] & 3 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0,4\}}, p_4^{\{3,5\}} \rangle \\
5 : [p_1^{\{0,1\}}, p_3^{\{2\}}, p_4^{\{3\}}] &
\end{array}\right)$$

81 : Asym, 4 symbols, 28 literals, symm syms : $(p_2, p_1)(p_4, p_3)$
Conj Res : 5x2:3, 4x3:5, 4x1:0, 0x2:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{1\}}, p_3^{\{2,3\}}, p_4^{\{0\}}] & \\
1 : [\neg p_2^{\{1,3\}}, p_3^{\{2,3\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{4,5\}}, p_2^{\{2\}}, \neg p_3^{\{3,4\}}, p_4^{\{0,1\}} \rangle \\
2 : [p_1^{\{1\}}, p_2^{\{0\}}, p_3^{\{2,3\}}] & 1 : \langle p_1^{\{0,2\}}, \neg p_2^{\{1,3,5\}}, \neg p_3^{\{3,4\}} \rangle \\
3 : [\neg p_2^{\{1,3\}}, \neg p_3^{\{0,1\}}, \neg p_4^{\{2\}}] & 2 : \langle \neg p_1^{\{4,5\}}, p_3^{\{0,1,2\}}, \neg p_4^{\{3\}} \rangle \\
4 : [\neg p_1^{\{0,2,3\}}, \neg p_3^{\{0,1\}}] & 3 : \langle \neg p_1^{\{4,5\}}, \neg p_2^{\{1,3,5\}}, p_3^{\{0,1,2\}} \rangle \\
5 : [\neg p_1^{\{0,2,3\}}, \neg p_2^{\{1,3\}}] &
\end{array}\right)$$

82 : Asym, 4 symbols, 29 literals
Conj Res : 2x1:0, 0x5:1

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0,2,3\}}, p_3^{\{0,1\}}, p_4^{\{3,4\}}] & 0 : \langle p_1^{\{4\}}, \neg p_2^{\{0,1\}}, p_3^{\{0,2\}}, \neg p_4^{\{3\}} \rangle \\
1 : [\neg p_1^{\{1,2,4\}}, \neg p_2^{\{0,2,3\}}] & 1 : \langle \neg p_1^{\{1,2\}}, p_2^{\{4\}}, p_3^{\{0,2\}}, \neg p_4^{\{3\}} \rangle \\
2 : [\neg p_1^{\{1,2,4\}}, p_3^{\{0,1\}}, p_4^{\{3,4\}}] & 2 : \langle \neg p_1^{\{1,2\}}, \neg p_2^{\{0,1\}}, \neg p_3^{\{3,4\}} \rangle \\
3 : [\neg p_3^{\{2,3,4\}}, \neg p_4^{\{0,1\}}] & 3 : \langle \neg p_2^{\{0,1\}}, \neg p_3^{\{3,4\}}, p_4^{\{0,2\}} \rangle \\
4 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{2,3,4\}}] & 4 : \langle \neg p_1^{\{1,2\}}, \neg p_3^{\{3,4\}}, p_4^{\{0,2\}} \rangle
\end{array}\right)$$

83 : Asym, 4 symbols, 30 literals, symm syms : $(p_2, p_1)$

$$\left(\begin{array}{ll}
0 : [p_2^{\{1\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{2,3,4\}}] & \\
1 : [p_1^{\{0\}}, p_3^{\{1,4\}}, \neg p_4^{\{2,3,4\}}] & 0 : \langle p_1^{\{1,2\}}, \neg p_2^{\{3,5\}}, \neg p_3^{\{0,4\}} \rangle \\
2 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_4^{\{2,3,4\}}] & 1 : \langle \neg p_1^{\{4,5\}}, p_2^{\{0,2\}}, p_3^{\{1,3\}} \rangle \\
3 : [\neg p_2^{\{0,2,3\}}, p_3^{\{1,4\}}] & 2 : \langle \neg p_1^{\{4,5\}}, \neg p_2^{\{3,5\}}, \neg p_4^{\{0,1,2\}} \rangle \\
4 : [\neg p_1^{\{1,2,4\}}, \neg p_3^{\{0,3\}}] & 3 : \langle \neg p_2^{\{3,5\}}, \neg p_3^{\{0,4\}}, \neg p_4^{\{0,1,2\}} \rangle \\
5 : [\neg p_1^{\{1,2,4\}}, \neg p_2^{\{0,2,3\}}] & 4 : \langle \neg p_1^{\{4,5\}}, p_3^{\{1,3\}}, \neg p_4^{\{0,1,2\}} \rangle
\end{array}\right)$$

84 : Asym, 4 symbols, 30 literals, pures : $p_4$, symm syms : $(p_2, p_1)$
Conj Res : 3x4:5, 2x4:0, 2x3:1, 1x0:2
Disj Res : 4x3:2, 1x2:4, 0x2:3

$$\left(\begin{array}{ll}
0 : [p_2^{\{0\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{2,3,4\}}] & \\
1 : [\neg p_2^{\{1,3,4\}}, p_3^{\{0\}}, \neg p_4^{\{2,3,4\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0\}}, p_3^{\{1\}}, p_4^{\{2\}} \rangle \\
2 : [\neg p_2^{\{1,3,4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,4\}}, \neg p_3^{\{0,2,3\}} \rangle \\
3 : [\neg p_1^{\{0,1,2,4\}}, \neg p_3^{\{1,2,3\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2,3\}}, \neg p_4^{\{0,1,5\}} \rangle \\
4 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{1,3,4\}}] & 3 : \langle \neg p_2^{\{1,2,4\}}, \neg p_3^{\{0,2,3\}}, \neg p_4^{\{0,1,5\}} \rangle \\
5 : [\neg p_1^{\{0,1,2,4\}}, \neg p_4^{\{2,3,4\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,4\}}, \neg p_4^{\{0,1,5\}} \rangle
\end{array}\right)$$

85 : Asym, 4 symbols, 31 literals, pures : $p_1$, symm syms : $(p_4, p_2, p_3)$

$$\left(\begin{array}{ll} 0 : [p_2^{\{0\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{1,4\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0\}}, p_3^{\{1\}}, \neg p_4^{\{2,3\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0\}}, p_4^{\{1,4\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{0,1\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0,3\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,4\}}, \neg p_3^{\{0,2,5\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,4\}}, \neg p_4^{\{0,3\}}] & 3 : \langle \neg p_2^{\{1,2,4\}}, \neg p_3^{\{0,2,5\}}, \neg p_4^{\{2,3\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{2,3,4\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,4\}}, p_4^{\{0,1\}} \rangle \\ 5 : [\neg p_1^{\{0,1,2,4\}}, \neg p_3^{\{1,2,3\}}] & \end{array}\right)$$

86 : Asym, 4 symbols, 31 literals, pures : $p_1$, symm syms : $(p_3, p_2)$
Disj Res : 4x3:2, 1x3:2

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_3^{\{1,3\}}, \neg p_4^{\{2,3\}}] & \\ 1 : [\neg p_2^{\{0\}}, p_3^{\{1,3\}}, \neg p_4^{\{2,3\}}] & 0 : \langle p_1^{\{0,3,4\}}, \neg p_2^{\{1,6\}}, \neg p_3^{\{2,5\}} \rangle \\ 2 : [p_2^{\{1,2\}}, \neg p_3^{\{0\}}, \neg p_4^{\{2,3\}}] & 1 : \langle \neg p_1^{\{5,6\}}, p_2^{\{2,3,4\}}, p_3^{\{0,1,3\}} \rangle \\ 3 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_3^{\{1,3\}}] & 2 : \langle \neg p_1^{\{5,6\}}, p_2^{\{2,3,4\}}, \neg p_4^{\{0,1,2,4\}} \rangle \\ 4 : [p_1^{\{0\}}, p_2^{\{1,2\}}, \neg p_4^{\{2,3\}}] & 3 : \langle \neg p_1^{\{5,6\}}, p_3^{\{0,1,3\}}, \neg p_4^{\{0,1,2,4\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0\}}] & \\ 6 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0\}}] & \end{array}\right)$$

87 : Asym, 4 symbols, 31 literals, pures : $p_4$, symm syms : $(p_3, p_2)$
Conj Res : 4x1:0, 4x5:2, 3x1:0, 3x2:4, 0x2:4, 0x6:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_3^{\{1,2\}}, p_4^{\{3,4\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2,5\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{2,4\}} \rangle \\ 1 : [\neg p_2^{\{0,2,3\}}, p_3^{\{1,2\}}, p_4^{\{3,4\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,4\}} \rangle \\ 2 : [\neg p_2^{\{0,2,3\}}, \neg p_3^{\{0,4\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_3^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{0,4\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_4^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_4^{\{0,1\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,1\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,2,3\}}] & \end{array}\right)$$

88 : Asym, 4 symbols, 31 literals, pures : $p_2$, symm syms : $(p_4, p_3)$
Conj Res : 0x5:1
Disj Res : 3x1:2, 2x4:3

$$\left(\begin{array}{ll} 0 : [p_2^{\{1,2\}}, p_3^{\{3,4\}}, \neg p_4^{\{0\}}] & 0 : \langle p_1^{\{1\}}, \neg p_2^{\{2,5\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0,4\}} \rangle \\ 1 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_3^{\{3,4\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, \neg p_3^{\{2,3\}} \rangle \\ 2 : [\neg p_2^{\{0,4\}}, \neg p_3^{\{0,1\}}, p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, p_4^{\{2\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{0,1\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,1\}}, p_4^{\{2\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_4^{\{0\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{2,5\}}, p_3^{\{0,1\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,4\}}] & \end{array}\right)$$

89 : Asym, 4 symbols, 31 literals, symm syms : $(p_3, p_2)$
Conj Res : 1x4:0
Disj Res : 3x1:2, 2x4:3

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{3\}}, p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & \\ 1 : [p_1^{\{3\}}, p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & \\ 2 : [p_1^{\{3\}}, p_2^{\{0,2\}}, p_3^{\{1,2\}}] & 0 : \langle \neg p_1^{\{5,6\}}, p_2^{\{2,3,4\}}, \neg p_4^{\{0,1\}} \rangle \\ 3 : [p_2^{\{0,2\}}, \neg p_3^{\{3\}}, p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{5,6\}}, p_3^{\{0,1,2\}}, p_4^{\{3,4\}} \rangle \\ 4 : [p_1^{\{3\}}, p_2^{\{0,2\}}, p_4^{\{1\}}] & 2 : \langle \neg p_1^{\{5,6\}}, p_2^{\{2,3,4\}}, p_3^{\{0,1,2\}} \rangle \\ 5 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{3\}}] & 3 : \langle p_1^{\{1,2,4\}}, \neg p_2^{\{0,5\}}, \neg p_3^{\{3,6\}} \rangle \\ 6 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{3\}}] & \end{array}\right)$$

90 : Asym, 4 symbols, 31 literals, symm syms : $(p_2, p_3)$
Conj Res : 4x1:2, 4x6:3, 2x0:1, 2x3:4, 1x5:0
Disj Res : 1x0:2

$$\left(\begin{array}{ll} 0 : [p_2^{\{1,2\}}, p_3^{\{0\}}, p_4^{\{3,4\}}] & 0 : \langle p_1^{\{1,5\}}, \neg p_2^{\{2\}}, p_3^{\{0,3\}}, \neg p_4^{\{4\}} \rangle \\ 1 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_4^{\{3,4\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0,1,5\}}, \neg p_4^{\{4\}} \rangle \\ 2 : [\neg p_1^{\{1,2,4\}}, \neg p_2^{\{0,3\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0,1,5\}}, \neg p_3^{\{4,5\}} \rangle \\ 3 : [\neg p_1^{\{1,2,4\}}, p_3^{\{0\}}, p_4^{\{3,4\}}] & 3 : \langle \neg p_2^{\{2\}}, \neg p_3^{\{4,5\}}, p_4^{\{0,1,3\}} \rangle \\ 4 : [\neg p_3^{\{2,3,4\}}, \neg p_4^{\{0,1\}}] & 4 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{4,5\}}, p_4^{\{0,1,3\}} \rangle \\ 5 : [p_1^{\{0\}}, p_2^{\{1,2\}}, \neg p_3^{\{2,3,4\}}] & \end{array}\right)$$

91 : Asym, 4 symbols, 32 literals, symm syms : $(p_3, p_1)(p_4, p_2)$
Conj Res : 1x4:5, 1x3:0, 0x2:3, 0x5:1
Disj Res : 4x1:2, 2x3:4

$$\left(\begin{array}{ll} 0 : [p_1^{\{4\}}, p_2^{\{1\}}, p_3^{\{0,2\}}, p_4^{\{0,3\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,1\}}, p_4^{\{0,2\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0,2\}}, \neg p_4^{\{1,4\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{1,3\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, p_4^{\{0,3\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_3^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_4^{\{1,4\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, p_4^{\{0,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{1,4\}}] & 4 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2,5\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{1,3\}} \rangle \\ 5 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{2,3,4\}}] & \end{array}\right)$$

92 : Asym, 4 symbols, 33 literals, symm syms : $(p_3, p_4)$

$$\left(\begin{array}{ll} 0 : [p_2^{\{1,3\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{2,3\}}] & \\ 1 : [\neg p_1^{\{1,3\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{2,3\}}] & 0 : \langle \neg p_2^{\{2,3,4\}}, \neg p_3^{\{0,1,3\}}, p_4^{\{3,5,6\}} \rangle \\ 2 : [\neg p_1^{\{1,3\}}, \neg p_2^{\{0,2\}}] & 1 : \langle \neg p_1^{\{1,2,5\}}, p_2^{\{0,6\}}, p_3^{\{4,5,6\}}, p_4^{\{3,5,6\}} \rangle \\ 3 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{0,3\}}, p_4^{\{0,1\}}] & 2 : \langle \neg p_2^{\{2,3,4\}}, p_3^{\{4,5,6\}}, \neg p_4^{\{0,1,4\}} \rangle \\ 4 : [\neg p_2^{\{0,2\}}, p_3^{\{1,2\}}, \neg p_4^{\{2,3\}}] & 3 : \langle \neg p_1^{\{1,2,5\}}, p_2^{\{0,6\}}, \neg p_3^{\{0,1,3\}}, \neg p_4^{\{0,1,4\}} \rangle \\ 5 : [\neg p_1^{\{1,3\}}, p_3^{\{1,2\}}, p_4^{\{0,1\}}] & \\ 6 : [p_2^{\{1,3\}}, p_3^{\{1,2\}}, p_4^{\{0,1\}}] & \end{array}\right)$$

93 : Asym, 4 symbols, 34 literals, pures : $p_1$, symm syms : $(p_3, p_4)$
Conj Res : 6x2:5, 0x2:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{1\}}, p_3^{\{0\}}, p_4^{\{2,3,4\}}] & \\ 1 : [p_2^{\{0\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{2,3,4\}}] & 0 : \langle \neg p_1^{\{5,6\}}, p_2^{\{1,2\}}, p_3^{\{0,4\}}, \neg p_4^{\{3\}} \rangle \\ 2 : [p_1^{\{1\}}, p_2^{\{0\}}, p_4^{\{2,3,4\}}] & 1 : \langle p_1^{\{0,2\}}, \neg p_2^{\{3,4,6\}}, \neg p_3^{\{1,3,5\}} \rangle \\ 3 : [\neg p_2^{\{1,3,4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{5,6\}}, \neg p_3^{\{1,3,5\}}, p_4^{\{0,1,2,4\}} \rangle \\ 4 : [\neg p_2^{\{1,3,4\}}, p_3^{\{0\}}, p_4^{\{2,3,4\}}] & 3 : \langle \neg p_2^{\{3,4,6\}}, \neg p_3^{\{1,3,5\}}, p_4^{\{0,1,2,4\}} \rangle \\ 5 : [\neg p_1^{\{0,2,4\}}, \neg p_3^{\{1,2,3\}}] & 4 : \langle \neg p_1^{\{5,6\}}, \neg p_2^{\{3,4,6\}}, p_4^{\{0,1,2,4\}} \rangle \\ 6 : [\neg p_1^{\{0,2,4\}}, \neg p_2^{\{1,3,4\}}] & \end{array}\right)$$

94 : Asym, 4 symbols, 35 literals, symm syms : $(p_3, p_2)$
Conj Res : 2x4:0, 2x5:1, 0x1:2, 0x6:4
Disj Res : 1x2:3, 1x4:3

$$\left(\begin{array}{ll}
0 : [p_1^{\{3\}}, p_2^{\{0,1\}}, p_3^{\{0,4\}}, \neg p_4^{\{0,2\}}] & 0 : \langle \neg p_1^{\{1,3\}}, p_2^{\{0,4\}}, p_3^{\{0,2\}}, \neg p_4^{\{0,5\}} \rangle \\
1 : [\neg p_1^{\{0,1,4\}}, \neg p_2^{\{2,3,4\}}] & 1 : \langle \neg p_1^{\{1,3\}}, p_2^{\{0,4\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{2,4\}} \rangle \\
2 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0,4\}}, p_4^{\{1,4\}}] & 2 : \langle \neg p_2^{\{1,2,5\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{0,5\}} \rangle \\
3 : [\neg p_1^{\{0,1,4\}}, \neg p_3^{\{1,2,3\}}] & 3 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2,5\}}, \neg p_3^{\{3,4,5\}} \rangle \\
4 : [p_2^{\{0,1\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{1,4\}}] & 4 : \langle \neg p_1^{\{1,3\}}, \neg p_2^{\{1,2,5\}}, p_3^{\{0,2\}}, p_4^{\{2,4\}} \rangle \\
5 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0,2\}}] &
\end{array}\right)$$

95 : Asym, 4 symbols, 35 literals, symm syms : $(p_2, p_3)$

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & \\
1 : [\neg p_1^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1,2\}}] & \\
2 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_2^{\{0,3\}}, p_3^{\{1,6,7\}}, \neg p_4^{\{2,4,5\}} \rangle \\
3 : [\neg p_2^{\{0,1\}}, \neg p_3^{\{1,3\}}, p_4^{\{1,2\}}] & 1 : \langle p_1^{\{5,6\}}, \neg p_2^{\{0,3\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{1,3,7\}} \rangle \\
4 : [p_2^{\{2,3\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{0,1,2\}}, p_2^{\{4,5,6,7\}}, p_4^{\{1,3,7\}} \rangle \\
5 : [p_1^{\{1\}}, p_2^{\{2,3\}}, \neg p_4^{\{0\}}] & 3 : \langle \neg p_1^{\{0,1,2\}}, p_2^{\{4,5,6,7\}}, \neg p_3^{\{2,3,4\}} \rangle \\
6 : [p_1^{\{1\}}, p_2^{\{2,3\}}, p_3^{\{0\}}] & \\
7 : [p_2^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1,2\}}] &
\end{array}\right)$$

96 : Asym, 4 symbols, 36 literals, symm syms : $(p_3, p_4)$
Conj Res : 7x0:1, 7x5:6, 6x4:5, 6x1:7, 5x2:4, 4x0:2

$$\left(\begin{array}{ll}
0 : [p_1^{\{2,4\}}, p_2^{\{0,1\}}, p_4^{\{3,4\}}] & \\
1 : [p_1^{\{2,4\}}, p_2^{\{0,1\}}, p_3^{\{2,3\}}] & 0 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0,1,2\}}, \neg p_4^{\{3,5\}} \rangle \\
2 : [p_2^{\{0,1\}}, p_3^{\{2,3\}}, p_4^{\{3,4\}}] & 1 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0,1,2\}}, \neg p_3^{\{3,5\}} \rangle \\
3 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,2\}}] & 2 : \langle p_1^{\{0,1\}}, \neg p_2^{\{3,4\}}, p_3^{\{1,2,6\}}, \neg p_4^{\{3,5\}} \rangle \\
4 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3,4\}}] & 3 : \langle \neg p_1^{\{4,5,6\}}, \neg p_2^{\{3,4\}}, p_3^{\{1,2,6\}}, p_4^{\{0,2,6\}} \rangle \\
5 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,2\}}] & 4 : \langle p_1^{\{0,1\}}, \neg p_2^{\{3,4\}}, \neg p_3^{\{3,5\}}, p_4^{\{0,2,6\}} \rangle \\
6 : [\neg p_1^{\{0,1,3\}}, p_3^{\{2,3\}}, p_4^{\{3,4\}}] &
\end{array}\right)$$

97 : Asym, 4 symbols, 38 literals, symm syms : $(p_4, p_3)$
Conj Res : 2x4:6, 1x6:2, 0x6:2

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0,2,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{0,4\}}] & \\
1 : [\neg p_1^{\{1,2,4\}}, \neg p_2^{\{0,2,3\}}] & \\
2 : [\neg p_1^{\{1,2,4\}}, p_3^{\{0,1\}}, p_4^{\{1,3\}}] & 0 : \langle p_1^{\{6,7\}}, \neg p_2^{\{0,1,3\}}, p_3^{\{0,2\}}, \neg p_4^{\{0,4,5\}} \rangle \\
3 : [\neg p_2^{\{0,2,3\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{1,3\}}] & 1 : \langle \neg p_1^{\{1,2,4\}}, p_2^{\{5,7\}}, p_3^{\{0,2\}}, p_4^{\{2,3,6\}} \rangle \\
4 : [\neg p_1^{\{1,2,4\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0,4\}}] & 2 : \langle \neg p_1^{\{1,2,4\}}, \neg p_2^{\{0,1,3\}}, \neg p_3^{\{3,4,5,6,7\}} \rangle \\
5 : [p_2^{\{1\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0,4\}}] & 3 : \langle \neg p_2^{\{0,1,3\}}, \neg p_3^{\{3,4,5,6,7\}}, p_4^{\{2,3,6\}} \rangle \\
6 : [p_1^{\{0\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{1,3\}}] & 4 : \langle \neg p_1^{\{1,2,4\}}, \neg p_3^{\{3,4,5,6,7\}}, \neg p_4^{\{0,4,5\}} \rangle \\
7 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{2,3,4\}}] &
\end{array}\right)$$

98 : Asym, 4 symbols, 40 literals, symm syms : $(p_2, p_1)$
Conj Res : 7x4:5, 7x3:6, 6x1:3, 6x5:7, 5x1:4
Disj Res : 3x4:2

$$\left(\begin{array}{ll}
0 : [p_1^{\{1,4\}}, p_2^{\{0,3\}}, \neg p_4^{\{1,2\}}] & \\
1 : [p_2^{\{0,3\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{5,6,7\}}, p_2^{\{0,1,2\}}, p_4^{\{3,4,6\}} \rangle \\
2 : [p_1^{\{1,4\}}, p_2^{\{0,3\}}, \neg p_3^{\{2,3,4\}}] & 1 : \langle p_1^{\{0,2,4\}}, \neg p_2^{\{3,5\}}, p_3^{\{6\}}, \neg p_4^{\{0,1,7\}} \rangle \\
3 : [\neg p_2^{\{1,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,4\}}] & 2 : \langle \neg p_1^{\{5,6,7\}}, \neg p_3^{\{1,2,3,4,7\}}, \neg p_4^{\{0,1,7\}} \rangle \\
4 : [p_1^{\{1,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,4\}}] & 3 : \langle \neg p_1^{\{5,6,7\}}, p_2^{\{0,1,2\}}, \neg p_3^{\{1,2,3,4,7\}} \rangle \\
5 : [\neg p_1^{\{0,2,3\}}, \neg p_2^{\{1,4\}}] & 4 : \langle p_1^{\{0,2,4\}}, \neg p_2^{\{3,5\}}, \neg p_3^{\{1,2,3,4,7\}}, p_4^{\{3,4,6\}} \rangle \\
6 : [\neg p_1^{\{0,2,3\}}, p_3^{\{1\}}, p_4^{\{0,4\}}] & \\
7 : [\neg p_1^{\{0,2,3\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,2\}}] &
\end{array}\right)$$

99 : Asym, 4 symbols, 40 literals
Conj Res : 4x0:2, 4x1:2, 4x5:3, 2x3:4, 2x7:1, 1x5:7, 0x7:1
Disj Res : 0x2:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{1,3,4\}}, \neg p_2^{\{0,2\}}] & \\
1 : [\neg p_1^{\{1,3,4\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0\}}] & \\
2 : [p_2^{\{1,4\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0\}}] & 0 : \langle p_1^{\{3,7,8\}}, \neg p_2^{\{0,4\}}, p_3^{\{5,6\}}, \neg p_4^{\{1,2\}} \rangle \\
3 : [p_1^{\{0\}}, p_2^{\{1,4\}}, \neg p_3^{\{2,3,4\}}] & 1 : \langle \neg p_1^{\{0,1,5\}}, p_2^{\{2,3,6,8\}}, p_4^{\{4,5,6,7,8\}} \rangle \\
4 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{1,2,3\}}] & 2 : \langle \neg p_2^{\{0,4\}}, \neg p_3^{\{1,2,3,4,7\}}, p_4^{\{4,5,6,7,8\}} \rangle \\
5 : [\neg p_1^{\{1,3,4\}}, p_3^{\{0\}}, p_4^{\{1,2,3\}}] & 3 : \langle \neg p_1^{\{0,1,5\}}, \neg p_3^{\{1,2,3,4,7\}}, p_4^{\{4,5,6,7,8\}} \rangle \\
6 : [p_2^{\{1,4\}}, p_3^{\{0\}}, p_4^{\{1,2,3\}}] & 4 : \langle \neg p_1^{\{0,1,5\}}, p_2^{\{2,3,6,8\}}, \neg p_3^{\{1,2,3,4,7\}} \rangle \\
7 : [p_1^{\{0\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{1,2,3\}}] & \\
8 : [p_1^{\{0\}}, p_2^{\{1,4\}}, p_4^{\{1,2,3\}}] &
\end{array}\right)$$

100 : Asym, 4 symbols, 42 literals, symm syms : $(p_4, p_3)$
Conj Res : 8x2:3, 8x5:6, 8x4:7, 7x2:3, 7x0:4, 6x3:8, 6x7:8, 6x0:5, 3x4:7, 3x1:2, 2x0:1
Disj Res : 4x2:3, 1x2:3

$$\left(\begin{array}{ll}
0 : [p_1^{\{0\}}, \neg p_2^{\{2,3\}}, p_3^{\{1,2\}}] & \\
1 : [\neg p_1^{\{1\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{0,2\}}] & \\
2 : [\neg p_2^{\{2,3\}}, p_3^{\{1,2\}}, \neg p_4^{\{0,2\}}] & \\
3 : [p_2^{\{0,1\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{0,2\}}] & 0 : \langle p_1^{\{0,7,8\}}, p_2^{\{3,9\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{1,2,3,5\}} \rangle \\
4 : [\neg p_1^{\{1\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{0,3\}}] & 1 : \langle \neg p_1^{\{1,4,5\}}, p_2^{\{3,9\}}, p_3^{\{0,2,8,9\}}, p_4^{\{6,7,8,9\}} \rangle \\
5 : [\neg p_1^{\{1\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_2^{\{0,1,2,4,6,7\}}, p_3^{\{0,2,8,9\}}, \neg p_4^{\{1,2,3,5\}} \rangle \\
6 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{0,3\}}, p_4^{\{1,3\}}] & 3 : \langle \neg p_2^{\{0,1,2,4,6,7\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{6,7,8,9\}} \rangle \\
7 : [p_1^{\{0\}}, \neg p_2^{\{2,3\}}, p_4^{\{1,3\}}] & \\
8 : [p_1^{\{0\}}, p_3^{\{1,2\}}, p_4^{\{1,3\}}] & \\
9 : [p_2^{\{0,1\}}, p_3^{\{1,2\}}, p_4^{\{1,3\}}] &
\end{array}\right)$$

101 : Asym, 4 symbols, 44 literals, symm syms : $(p_3, p_4)$
Conj Res : 9x0:8, 9x7:8, 8x6:7, 8x2:0, 7x4:6, 7x2:0, 6x1:4, 6x5:4, 3x1:5, 3x4:5, 2x4:1, 2x5:1, 0x6:7, 0x1:2

$$\left(\begin{array}{ll}
0:[p_1^{\{0,3\}},\neg p_3^{\{0,2\}},p_4^{\{0,1\}}] & \\
1:[p_1^{\{0,3\}},p_2^{\{2\}},p_4^{\{0,1\}}] & \\
2:[\neg p_1^{\{1\}},\neg p_2^{\{0,3\}},\neg p_3^{\{0,2\}}] & \\
3:[\neg p_2^{\{0,3\}},\neg p_3^{\{0,2\}},p_4^{\{0,1\}}] & 0:\langle p_1^{\{0,1,6,8\}},\neg p_2^{\{2,3,4,7\}},\neg p_3^{\{0,2,3,5\}},p_4^{\{0,1,3,9\}}\rangle \\
4:[\neg p_1^{\{1\}},\neg p_2^{\{0,3\}},\neg p_4^{\{2,3\}}] & 1:\langle\neg p_1^{\{2,4,5\}},p_3^{\{6,7,8,9\}},p_4^{\{0,1,3,9\}}\rangle \\
5:[\neg p_1^{\{1\}},\neg p_3^{\{0,2\}},\neg p_4^{\{2,3\}}] & 2:\langle p_2^{\{1,8,9\}},\neg p_3^{\{0,2,3,5\}},\neg p_4^{\{4,5,6,7\}}\rangle \\
6:[p_1^{\{0,3\}},p_3^{\{1,3\}},\neg p_4^{\{2,3\}}] & 3:\langle p_1^{\{0,1,6,8\}},\neg p_2^{\{2,3,4,7\}},p_3^{\{6,7,8,9\}},\neg p_4^{\{4,5,6,7\}}\rangle \\
7:[\neg p_2^{\{0,3\}},p_3^{\{1,3\}},\neg p_4^{\{2,3\}}] & \\
8:[p_1^{\{0,3\}},p_2^{\{2\}},p_3^{\{1,3\}}] & \\
9:[p_2^{\{2\}},p_3^{\{1,3\}},p_4^{\{0,1\}}] &
\end{array}\right)$$

102 : Asym, 4 symbols, 44 literals, symm syms : $(p_1,p_2)(p_3,p_4)$
Conj Res : 9x0:1, 9x6:8, 8x0:1, 8x7:6, 7x2:4, 7x5:4, 6x4:7, 3x4:2, 3x5:2, 1x6:8, 1x3:0, 0x2:3

$$\left(\begin{array}{ll}
0:[p_1^{\{1,5\}},p_2^{\{0,4\}},p_3^{\{0,1,2\}},\neg p_4^{\{0,1,3\}}] & 0:\langle\neg p_1^{\{2,3,4\}},p_2^{\{0,1\}},p_3^{\{0,2,5\}},\neg p_4^{\{0,3,6\}}\rangle \\
1:[p_1^{\{1,5\}},p_2^{\{0,4\}},\neg p_3^{\{3,4,5\}},p_4^{\{2,4,5\}}] & 1:\langle p_1^{\{0,1\}},\neg p_2^{\{4,5,6\}},p_3^{\{0,2,5\}},\neg p_4^{\{0,3,6\}}\rangle \\
2:[\neg p_1^{\{0,2,3,4\}},p_3^{\{0,1,2\}},p_4^{\{2,4,5\}}] & 2:\langle\neg p_1^{\{2,3,4\}},\neg p_2^{\{4,5,6\}},p_3^{\{0,2,5\}},p_4^{\{1,2,5\}}\rangle \\
3:[\neg p_1^{\{0,2,3,4\}},\neg p_3^{\{3,4,5\}},\neg p_4^{\{0,1,3\}}] & 3:\langle\neg p_1^{\{2,3,4\}},\neg p_2^{\{4,5,6\}},\neg p_3^{\{1,3,6\}},\neg p_4^{\{0,3,6\}}\rangle \\
4:[\neg p_1^{\{0,2,3,4\}},\neg p_2^{\{1,2,3,5\}}] & 4:\langle\neg p_1^{\{2,3,4\}},p_2^{\{0,1\}},\neg p_3^{\{1,3,6\}},p_4^{\{1,2,5\}}\rangle \\
5:[\neg p_2^{\{1,2,3,5\}},p_3^{\{0,1,2\}},p_4^{\{2,4,5\}}] & 5:\langle p_1^{\{0,1\}},\neg p_2^{\{4,5,6\}},\neg p_3^{\{1,3,6\}},p_4^{\{1,2,5\}}\rangle \\
6:[\neg p_2^{\{1,2,3,5\}},\neg p_3^{\{3,4,5\}},\neg p_4^{\{0,1,3\}}] &
\end{array}\right)$$

103 : Asym, 4 symbols, 46 literals, symm syms : $(p_4,p_3)(p_2,p_1)$

$$\left(\begin{array}{ll}
0:[\neg p_1^{\{0,1,3\}},\neg p_2^{\{1,2,4\}},\neg p_3^{\{3,4,5\}}] & \\
1:[p_1^{\{2,4,5\}},p_3^{\{0,1,2\}},p_4^{\{1,3,4\}}] & 0:\langle\neg p_1^{\{0,6,7\}},p_2^{\{2,3,4\}},p_3^{\{1,2,3\}},\neg p_4^{\{5,6,7\}}\rangle \\
2:[p_1^{\{2,4,5\}},p_2^{\{0,3,5\}},p_3^{\{0,1,2\}}] & 1:\langle\neg p_1^{\{0,6,7\}},\neg p_2^{\{0,5,6\}},p_3^{\{1,2,3\}},p_4^{\{1,3,4\}}\rangle \\
3:[p_2^{\{0,3,5\}},p_3^{\{0,1,2\}},p_4^{\{1,3,4\}}] & 2:\langle p_1^{\{1,2,4\}},\neg p_2^{\{0,5,6\}},p_3^{\{1,2,3\}},\neg p_4^{\{5,6,7\}}\rangle \\
4:[p_1^{\{2,4,5\}},p_2^{\{0,3,5\}},p_4^{\{1,3,4\}}] & 3:\langle\neg p_1^{\{0,6,7\}},p_2^{\{2,3,4\}},\neg p_3^{\{0,5,7\}},p_4^{\{1,3,4\}}\rangle \\
5:[\neg p_2^{\{1,2,4\}},\neg p_3^{\{3,4,5\}},\neg p_4^{\{0,2,5\}}] & 4:\langle p_1^{\{1,2,4\}},\neg p_2^{\{0,5,6\}},\neg p_3^{\{0,5,7\}},p_4^{\{1,3,4\}}\rangle \\
6:[\neg p_1^{\{0,1,3\}},\neg p_2^{\{1,2,4\}},\neg p_4^{\{0,2,5\}}] & 5:\langle p_1^{\{1,2,4\}},p_2^{\{2,3,4\}},\neg p_3^{\{0,5,7\}},\neg p_4^{\{5,6,7\}}\rangle \\
7:[\neg p_1^{\{0,1,3\}},\neg p_3^{\{3,4,5\}},\neg p_4^{\{0,2,5\}}] &
\end{array}\right)$$

104 : Asym, 4 symbols, 48 literals, symm syms : $(p_3,p_2,p_1,p_4)$

$$\left(\begin{array}{ll}
0:[\neg p_1^{\{1,4\}},p_2^{\{0\}},p_3^{\{1,3\}},p_4^{\{1,2\}}] & \\
1:[p_1^{\{0,2,3\}},\neg p_2^{\{2,3,4\}},p_4^{\{1,2\}}] & \\
2:[p_1^{\{0,2,3\}},\neg p_2^{\{2,3,4\}},p_3^{\{1,3\}}] & \\
3:[\neg p_1^{\{1,4\}},\neg p_2^{\{2,3,4\}},\neg p_3^{\{0,2,4\}}] & 0:\langle p_1^{\{1,2,4,7\}},p_2^{\{0\}},\neg p_3^{\{3,4,5,9\}},\neg p_4^{\{6,7,8,9\}}\rangle \\
4:[p_1^{\{0,2,3\}},\neg p_3^{\{0,2,4\}},p_4^{\{1,2\}}] & 1:\langle\neg p_1^{\{0,3,8,9\}},p_3^{\{0,2,6,7\}},p_4^{\{0,1,4,5\}}\rangle \\
5:[\neg p_2^{\{2,3,4\}},\neg p_3^{\{0,2,4\}},p_4^{\{1,2\}}] & 2:\langle p_1^{\{1,2,4,7\}},\neg p_2^{\{1,2,3,5,6,8\}},\neg p_3^{\{3,4,5,9\}},p_4^{\{0,1,4,5\}}\rangle \\
6:[\neg p_2^{\{2,3,4\}},p_3^{\{1,3\}},\neg p_4^{\{0,3,4\}}] & 3:\langle p_1^{\{1,2,4,7\}},\neg p_2^{\{1,2,3,5,6,8\}},p_3^{\{0,2,6,7\}},\neg p_4^{\{6,7,8,9\}}\rangle \\
7:[p_1^{\{0,2,3\}},p_3^{\{1,3\}},\neg p_4^{\{0,3,4\}}] & 4:\langle\neg p_1^{\{0,3,8,9\}},\neg p_2^{\{1,2,3,5,6,8\}},\neg p_3^{\{3,4,5,9\}},\neg p_4^{\{6,7,8,9\}}\rangle \\
8:[\neg p_1^{\{1,4\}},\neg p_2^{\{2,3,4\}},\neg p_4^{\{0,3,4\}}] & \\
9:[\neg p_1^{\{1,4\}},\neg p_3^{\{0,2,4\}},\neg p_4^{\{0,3,4\}}] &
\end{array}\right)$$

105 : Asym, 4 symbols, 50 literals, symm syms : $(p_3, p_1, p_4)$
Conj Res : 7x8:6, 6x3:8, 6x9:8, 5x8:3, 5x9:3, 4x3:5, 2x8:6, 2x4:1, 2x5:1, 1x3:5, 1x6:2, 1x7:2

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,3,4\}}] & \\
1 : [p_2^{\{0\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,3,4\}}] & \\
2 : [\neg p_2^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0\}}] & \\
3 : [\neg p_1^{\{0\}}, \neg p_2^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}] & \\
4 : [\neg p_2^{\{1,2,3\}}, p_3^{\{0\}}, \neg p_4^{\{1,3,4\}}] & 0 : \langle \neg p_1^{\{0,3,5\}}, p_2^{\{1,10,11\}}, p_3^{\{4,8,9\}}, p_4^{\{2,6,7\}} \rangle \\
5 : [\neg p_1^{\{0\}}, \neg p_2^{\{1,2,3\}}, \neg p_4^{\{1,3,4\}}] & 1 : \langle p_1^{\{6,7,8,9,10,11\}}, \neg p_2^{\{2,3,4,5,7,8\}}, \neg p_4^{\{0,1,4,5,9,11\}} \rangle \\
6 : [p_1^{\{1,2,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0\}}] & 2 : \langle p_1^{\{6,7,8,9,10,11\}}, \neg p_2^{\{2,3,4,5,7,8\}}, \neg p_3^{\{0,1,2,3,6,10\}} \rangle \\
7 : [p_1^{\{1,2,4\}}, \neg p_2^{\{1,2,3\}}, p_4^{\{0\}}] & 3 : \langle \neg p_2^{\{2,3,4,5,7,8\}}, \neg p_3^{\{0,1,2,3,6,10\}}, \neg p_4^{\{0,1,4,5,9,11\}} \rangle \\
8 : [p_1^{\{1,2,4\}}, \neg p_2^{\{1,2,3\}}, p_3^{\{0\}}] & 4 : \langle p_1^{\{6,7,8,9,10,11\}}, \neg p_3^{\{0,1,2,3,6,10\}}, \neg p_4^{\{0,1,4,5,9,11\}} \rangle \\
9 : [p_1^{\{1,2,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,3,4\}}] & \\
10 : [p_1^{\{1,2,4\}}, p_2^{\{0\}}, \neg p_3^{\{2,3,4\}}] & \\
11 : [p_1^{\{1,2,4\}}, p_2^{\{0\}}, \neg p_4^{\{1,3,4\}}] &
\end{array}\right)$$

106 : Asym, 4 symbols, 52 literals, symm syms : $(p_1, p_4, p_3, p_2)$
Conj Res : 11x0:1, 11x4:9, 11x8:9, 10x0:1, 10x2:6, 10x7:6, 9x5:4, 9x1:11, 9x10:11, 8x5:4, 8x2:7, 8x6:7, 7x3:2, 7x4:8, 7x9:8, 6x3:2, 6x1:10, 6x11:10, 4x0:5, 4x3:5, 2x0:3, 2x5:3, 1x3:0, 1x5:0

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,2\}}, p_2^{\{0,4\}}, p_3^{\{0,1\}}, p_4^{\{0,3\}}] & \\
1 : [p_1^{\{1,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,3\}}] & \\
2 : [p_1^{\{1,4\}}, p_2^{\{0,4\}}, \neg p_3^{\{2,3,4\}}] & \\
3 : [p_2^{\{0,4\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,4\}}] & 0 : \langle \neg p_1^{\{0,4,9,10\}}, p_2^{\{0,2,3\}}, p_3^{\{0,7,8\}}, p_4^{\{0,1,5,6\}} \rangle \\
4 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,4\}}] & 1 : \langle p_1^{\{1,2,6,8\}}, \neg p_2^{\{5,6,7,8,9,10\}}, p_3^{\{0,7,8\}}, \neg p_4^{\{3,4,7,10\}} \rangle \\
5 : [\neg p_2^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,3\}}] & 2 : \langle \neg p_1^{\{0,4,9,10\}}, \neg p_2^{\{5,6,7,8,9,10\}}, \neg p_3^{\{1,2,3,4,5,9\}} \rangle \\
6 : [p_1^{\{1,4\}}, \neg p_2^{\{1,2,3\}}, p_4^{\{0,3\}}] & 3 : \langle \neg p_2^{\{5,6,7,8,9,10\}}, \neg p_3^{\{1,2,3,4,5,9\}}, p_4^{\{0,1,5,6\}} \rangle \\
7 : [\neg p_2^{\{1,2,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,4\}}] & 4 : \langle p_1^{\{1,2,6,8\}}, p_2^{\{0,2,3\}}, \neg p_3^{\{1,2,3,4,5,9\}}, \neg p_4^{\{3,4,7,10\}} \rangle \\
8 : [p_1^{\{1,4\}}, \neg p_2^{\{1,2,3\}}, p_3^{\{0,1\}}] & \\
9 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}] & \\
10 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2,3\}}, \neg p_4^{\{1,4\}}] &
\end{array}\right)$$

107 : Asym, 4 symbols, 52 literals, symm syms : $(p_4, p_1)(p_3, p_2)$
Conj Res : 8x1:6, 8x5:6, 8x10:7, 7x4:10, 7x9:10, 6x7:8, 6x9:5, 5x4:9, 5x10:9, 3x9:4, 3x10:4, 2x4:3, 2x5:1, 2x6:1, 1x9:5, 1x3:2

## 7 models 56 theories

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0\}}, \neg p_3^{\{2\}}, \neg p_4^{\{1\}}] & 0 : \langle \neg p_1^{\{1\}}, \neg p_2^{\{0\}} \rangle \\
1 : [\neg p_1^{\{0,1,2\}}] & 1 : \langle \neg p_1^{\{1\}}, \neg p_4^{\{0\}} \rangle \\
 & 2 : \langle \neg p_1^{\{1\}}, \neg p_3^{\{0\}} \rangle
\end{array}\right)$$

108 : Asym, 4 symbols, 10 literals, pures : $p_4, p_3, p_2, p_1$, symm syms : $(p_4, p_3, p_2)$

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{0\}}, \neg p_4^{\{1\}}] & \\
1 : [\neg p_1^{\{1\}}, \neg p_2^{\{0\}}] & 0 : \langle \neg p_2^{\{0,1\}}, \neg p_3^{\{2,3\}} \rangle \\
2 : [\neg p_3^{\{0\}}, \neg p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{1,3\}}, \neg p_4^{\{0,2\}} \rangle \\
3 : [\neg p_1^{\{1\}}, \neg p_3^{\{0\}}] &
\end{array}\right)$$

109 : Asym, 4 symbols, 12 literals, pures : $p_2, p_4, p_1, p_3$, symm syms : $(p_2, p_4, p_1, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,1\}}] & 0 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{0,1,3\}}, \neg p_3^{\{0,2\}} \rangle \\ 2 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{0,1\}}] & 2 : \langle \neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3\}} \rangle \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & \end{array}\right)$$

110 : Asym, 4 symbols, 15 literals, pures : $p_1, p_3, p_4, p_2$, symm syms : $(p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0\}}] & 0 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{0,1,3\}}, p_4^{\{2\}} \rangle \\ 2 : [\neg p_2^{\{0,2\}}, p_4^{\{1\}}] & 2 : \langle \neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3\}} \rangle \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}] & \end{array}\right)$$

111 : Asym, 4 symbols, 15 literals, pures : $p_3, p_1, p_2$
Conj Res : 2x1:3

$$\left(\begin{array}{ll} 0 : [p_2^{\{2\}}, \neg p_3^{\{0\}}, \neg p_4^{\{1\}}] & 0 : \langle p_1^{\{2\}}, \neg p_2^{\{3\}}, \neg p_3^{\{0,1\}} \rangle \\ 1 : [\neg p_1^{\{2\}}, \neg p_3^{\{0\}}, \neg p_4^{\{1\}}] & 1 : \langle p_1^{\{2\}}, \neg p_2^{\{3\}}, \neg p_4^{\{0,1\}} \rangle \\ 2 : [p_1^{\{0,1\}}, p_2^{\{2\}}] & 2 : \langle \neg p_1^{\{1,3\}}, p_2^{\{0,2\}} \rangle \\ 3 : [\neg p_1^{\{2\}}, \neg p_2^{\{0,1\}}] & \end{array}\right)$$

112 : Asym, 4 symbols, 18 literals, pures : $p_4, p_3$, symm syms : $(p_2, p_1)(p_4, p_3)$
Conj Res : 2x1:0, 0x3:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_3^{\{1\}}, p_4^{\{2\}}] & \\ 1 : [\neg p_2^{\{0\}}, p_3^{\{1\}}, p_4^{\{2\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{2\}}, \neg p_4^{\{3\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_4^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0\}}] & \end{array}\right)$$

113 : Asym, 4 symbols, 20 literals, pures : $p_2$, symm syms : $(p_4, p_3)$
Conj Res : 0x4:1

$$\left(\begin{array}{ll} 0 : [p_2^{\{0\}}, \neg p_3^{\{1,2\}}, p_4^{\{3\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{2,3\}}, \neg p_4^{\{0,1\}}] & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,2\}}] & 2 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{0,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_4^{\{0\}} \rangle \end{array}\right)$$

114 : Asym, 4 symbols, 20 literals, pures : $p_3, p_1$
Disj Res : 0x2:1

$$\left(\begin{array}{ll} 0 : [p_2^{\{0\}}, \neg p_3^{\{2\}}, \neg p_4^{\{1,3\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, p_3^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{2,3\}}, p_3^{\{0,1\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_3^{\{1\}}, \neg p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{2\}}] & 2 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{0,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, \neg p_4^{\{0\}} \rangle \end{array}\right)$$

115 : Asym, 4 symbols, 20 literals, pures : $p_4, p_1$
Conj Res : 1x2:3
Disj Res : 1x2:3, 0x3:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{1\}}, p_3^{\{2\}}, \neg p_4^{\{0\}}] & \\ 1 : [\neg p_2^{\{1\}}, p_3^{\{2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{2\}}, \neg p_4^{\{0,1\}} \rangle \\ 2 : [p_1^{\{1\}}, p_2^{\{0\}}, p_3^{\{2\}}] & 1 : \langle p_1^{\{0,2\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{3\}} \rangle \\ 3 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{1\}}] & 2 : \langle \neg p_1^{\{3,4\}}, p_3^{\{0,1,2\}} \rangle \\ 4 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1\}}] & \end{array}\right)$$

116 : Asym, 4 symbols, 21 literals, pures : $p_4$
Conj Res : 2x1:0, 0x4:1

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,3\}}] & 0 : \langle \neg p_1^{\{0,1\}}, p_2^{\{3\}}, \neg p_4^{\{2\}} \rangle \\ 1 : [\neg p_1^{\{0,2\}}, p_3^{\{1\}}, p_4^{\{3\}}] & 1 : \langle p_1^{\{3\}}, \neg p_2^{\{0\}}, p_3^{\{1\}}, \neg p_4^{\{2\}} \rangle \\ 2 : [\neg p_3^{\{2,3\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{0,1\}}, \neg p_3^{\{2,3\}} \rangle \\ 3 : [p_1^{\{1\}}, p_2^{\{0\}}, \neg p_3^{\{2,3\}}] & 3 : \langle \neg p_2^{\{0\}}, \neg p_3^{\{2,3\}}, p_4^{\{1\}} \rangle \end{array}\right)$$

117 : Asym, 4 symbols, 22 literals, symm syms : $(p_1, p_3)(p_2, p_4)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2,3\}}, p_3^{\{0\}}, \neg p_4^{\{1,3\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{1,3\}}, p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,2\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}, \neg p_4^{\{1,3\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{1,3\}}] & 3 : \langle \neg p_2^{\{0,1,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{2,3\}}] & \end{array}\right)$$

118 : Asym, 4 symbols, 23 literals, pures : $p_2, p_1$, symm syms : $(p_3, p_4)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1\}}] & \\ 1 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,3\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,2\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}, \neg p_4^{\{0,3\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, p_4^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{1,3\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,4\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{2,3\}}] & 3 : \langle \neg p_2^{\{0,1,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{1,2\}} \rangle \end{array}\right)$$

119 : Asym, 4 symbols, 23 literals, pures : $p_2, p_1$, symm syms : $(p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,3\}}, p_3^{\{2\}}, p_4^{\{1\}}] & \\ 1 : [p_2^{\{2\}}, \neg p_3^{\{0,3\}}, p_4^{\{1\}}] & 0 : \langle \neg p_2^{\{0,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{3\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,3\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{1\}}, p_3^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,4\}}, \neg p_3^{\{1,2\}} \rangle \end{array}\right)$$

120 : Asym, 4 symbols, 23 literals, pures : $p_1$, symm syms : $(p_3, p_2)$
Disj Res : 1x0:3

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{3\}}, p_3^{\{2\}}, p_4^{\{1\}}] & \\ 1 : [\neg p_2^{\{0,2\}}, \neg p_3^{\{0,3\}}, p_4^{\{1\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{3\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,3\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,2\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \end{array}\right)$$

121 : Asym, 4 symbols, 25 literals, symm syms : $(p_2, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{2\}}, p_3^{\{1\}}, \neg p_4^{\{0\}} \rangle \\ 1 : [\neg p_2^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1,3\}}] & 1 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{0,2,3\}}, p_4^{\{1,2\}} \rangle \\ 2 : [p_2^{\{0\}}, \neg p_3^{\{1,2\}}, p_4^{\{1,3\}}] & 2 : \langle \neg p_2^{\{0,1,4\}}, \neg p_3^{\{0,2,3\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,2\}}] & 3 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{0,1,4\}}, p_4^{\{1,2\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3\}}] & \end{array}\right)$$

122 : Asym, 4 symbols, 25 literals, pures : $p_1$, symm syms : $(p_2, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,3\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{0,3\}}, p_3^{\{1\}} \rangle \\ 1 : [p_1^{\{3\}}, p_2^{\{1,4\}}, p_3^{\{0,2\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{1\}}, \neg p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,4\}}, \neg p_3^{\{3,4\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_3^{\{1\}}, \neg p_4^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{0,3\}}] & 3 : \langle p_1^{\{1\}}, \neg p_2^{\{0,3\}}, \neg p_3^{\{0,2\}} \rangle \\ & 4 : \langle \neg p_1^{\{2,3\}}, p_2^{\{1\}}, \neg p_3^{\{0,2\}} \rangle \end{array}\right)$$

123 : Asym, 4 symbols, 25 literals, pures : $p_4$, symm syms : $(p_3, p_2)$
Disj Res : 2x4:1, 1x0:2

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_4^{\{2,3\}}] & \\ 1 : [p_1^{\{0\}}, p_3^{\{1\}}, \neg p_4^{\{2,3\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{4,5\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,3\}}] & 1 : \langle \neg p_1^{\{2,4\}}, p_2^{\{0,5\}}, p_3^{\{1,3\}} \rangle \\ 3 : [\neg p_2^{\{0,3\}}, p_3^{\{1\}}, \neg p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{2,4\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\ 4 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,3\}}] & 3 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{4,5\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\ 5 : [p_2^{\{1\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{2,3\}}] & \end{array}\right)$$

124 : Asym, 4 symbols, 27 literals, pures : $p_4$, symm syms : $(p_2, p_3)$
Conj Res : 1x5:0, 1x2:3, 0x3:1, 0x4:5
Disj Res : 0x2:3

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_3^{\{0\}} \rangle \\ 0 : [p_1^{\{5\}}, p_2^{\{3\}}, p_3^{\{0\}}, \neg p_4^{\{1,2,4\}}] & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, \neg p_4^{\{0\}} \rangle \\ 1 : [\neg p_2^{\{0,1,4,5\}}, \neg p_3^{\{2,3,4,5\}}] & 2 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{2,3,4,5\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{0,1,4,5\}}] & 4 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}} \rangle \end{array}\right)$$

125 : Asym, 4 symbols, 28 literals, pures : $p_4$, symm syms : $(p_2, p_3, p_1)$
Disj Res : 5x1:4, 5x2:4, 3x1:2, 3x4:2, 0x2:1, 0x4:1

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,2\}}, \neg p_4^{\{0\}} \rangle \\ 0 : [\neg p_3^{\{1,4,5\}}, \neg p_4^{\{0,2,3\}}] & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{0\}} \rangle \\ 1 : [\neg p_2^{\{0,1,2,4\}}, p_3^{\{2,3\}}, p_4^{\{4,5\}}] & 2 : \langle \neg p_2^{\{1,2\}}, p_3^{\{1,3\}}, \neg p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{0,1,2,4\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_3^{\{1,3\}}, \neg p_4^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3,5\}}, p_3^{\{2,3\}}, p_4^{\{4,5\}}] & 4 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{0\}}, p_4^{\{1,3\}} \rangle \\ & 5 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{0\}}, p_4^{\{1,3\}} \rangle \end{array}\right)$$

126 : Asym, 4 symbols, 28 literals, pures : $p_2, p_1$, symm syms : $(p_2, p_1)(p_3, p_4)$
Disj Res : 5x0:1, 4x0:1, 3x1:0, 2x1:0

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 0 : [p_1^{\{5\}}, p_2^{\{1\}}, p_3^{\{0,3\}}, p_4^{\{2,4\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4,5\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{4,5\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_3^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{2,3,4,5\}}] & 4 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{2\}}, p_4^{\{0\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{2\}} \rangle \end{array}\right)$$

127 : Asym, 4 symbols, 28 literals, symm syms : $(p_2, p_1)(p_3, p_4)$
Disj Res : 5x2:4, 3x4:2, 2x0:3, 1x3:0

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_3^{\{1\}} \rangle \\ 0 : [p_2^{\{0,1\}}, p_3^{\{2,3\}}, p_4^{\{4,5\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_3^{\{0,4,5\}}, \neg p_4^{\{1,2,3\}}] & 2 : \langle \neg p_2^{\{2\}}, p_3^{\{0,3\}}, \neg p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{2,4\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0,3\}}, \neg p_4^{\{1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3,5\}}, p_3^{\{2,3\}}, p_4^{\{4,5\}}] & 4 : \langle \neg p_2^{\{2\}}, \neg p_3^{\{1\}}, p_4^{\{0,3\}} \rangle \\ & 5 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{1\}}, p_4^{\{0,3\}} \rangle \end{array}\right)$$

128 : Asym, 4 symbols, 28 literals, pures : $p_1$, symm syms : $(p_4, p_3)$
Conj Res : 0x2:3
Disj Res : 5x1:0, 3x0:1, 1x2:3, 0x4:5

$$\left(\begin{array}{ll} 0 : [p_2^{\{0,1\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{0,2\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,2\}}, \neg p_4^{\{0,1\}} \rangle \\ 1 : [\neg p_2^{\{3,4\}}, p_3^{\{1,2\}}, \neg p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,2\}}, p_3^{\{1,2\}} \rangle \\ 2 : [p_1^{\{4\}}, p_2^{\{0,1\}}, p_3^{\{1,2\}}, p_4^{\{3\}}] & 2 : \langle \neg p_1^{\{3,4\}}, p_3^{\{1,2\}}, \neg p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{3,4\}}] & 3 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{0,4\}}, p_4^{\{2\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{3,4\}}] & 4 : \langle p_1^{\{2\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{0,4\}} \rangle \end{array}\right)$$

129 : Asym, 4 symbols, 29 literals, symm syms : $(p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1\}}, p_2^{\{2\}}, \neg p_3^{\{1,3\}}] & \\ 1 : [p_1^{\{0,1\}}, p_2^{\{2\}}, \neg p_4^{\{0,3\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{3\}}, p_3^{\{4\}}, \neg p_4^{\{1,2,5\}} \rangle \\ 2 : [p_2^{\{2\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,3\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{3\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{4\}} \rangle \\ 3 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1,2\}} \rangle \\ 4 : [\neg p_1^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2,5\}}, \neg p_4^{\{1,2,5\}} \rangle \\ 5 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,3\}}] & \end{array}\right)$$

130 : Asym, 4 symbols, 30 literals, symm syms : $(p_3, p_4)$
Conj Res : 2x3:5, 1x5:2, 0x5:2

$$\left(\begin{array}{ll} 0 : [p_1^{\{2,3\}}, p_2^{\{0,1\}}, p_3^{\{4\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_4^{\{2,4\}} \rangle \\ 1 : [p_1^{\{2,3\}}, p_2^{\{0,1\}}, p_4^{\{4\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_3^{\{2,4\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}}] & 2 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{2,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1,4\}}, \neg p_2^{\{2,3,4\}}] & 3 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{2,4\}} \rangle \\ 4 : [\neg p_1^{\{0,1,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}}] & 4 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \end{array}\right)$$

131 : Asym, 4 symbols, 30 literals, symm syms : $(p_3, p_4)(p_2, p_1)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{5\}}, p_3^{\{1,3\}}, p_4^{\{0,2,4\}}] & 0 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,1\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4,5\}}, p_3^{\{1,3\}}, p_4^{\{0,2,4\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{2\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{0,4,5\}}, \neg p_4^{\{1\}}] & 2 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{1,2,4\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{0,4,5\}}] & 3 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{1,2,4\}}, p_3^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{2,3,4,5\}}] & 4 : \langle \neg p_2^{\{1,2,4\}}, \neg p_3^{\{2,3\}}, p_4^{\{0,1\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2,4\}}, \neg p_3^{\{2,3\}} \rangle \end{array}\right)$$

132 : Asym, 4 symbols, 31 literals, pures : $p_2$
Conj Res : 0x4:1
Disj Res : 5x0:4, 5x2:4, 3x0:2, 3x4:2, 2x1:3

$$\left(\begin{array}{ll} 0 : [p_1^{\{5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,3,4\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_3^{\{0,1\}}, p_4^{\{2\}} \rangle \\ 1 : [\neg p_2^{\{4,5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,3,4\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{2\}}, p_3^{\{0,1\}} \rangle \\ 2 : [p_2^{\{1,2\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{3,4\}}, p_2^{\{2\}}, \neg p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{4,5\}}] & 3 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{3,4,5\}}] & 4 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{2,4\}}, \neg p_4^{\{0,1\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{2,4\}} \rangle \end{array}\right)$$

133 : Asym, 4 symbols, 31 literals
Conj Res : 0x3:1
Disj Res : 5x3:4, 2x4:3, 1x3:2, 0x2:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{2,3\}}] & \\ 1 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0\}}] & 0 : \langle p_1^{\{0,5\}}, \neg p_2^{\{3,4\}}, p_3^{\{6\}}, \neg p_4^{\{1,2\}} \rangle \\ 2 : [p_2^{\{1\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{1,3,6\}}, p_2^{\{0,2\}}, p_4^{\{4,5,6\}} \rangle \\ 3 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,3\}}] & 2 : \langle \neg p_1^{\{1,3,6\}}, \neg p_3^{\{0,1,2,4,5\}} \rangle \\ 4 : [\neg p_2^{\{0,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}}] & 3 : \langle \neg p_2^{\{3,4\}}, \neg p_3^{\{0,1,2,4,5\}}, p_4^{\{4,5,6\}} \rangle \\ 5 : [p_1^{\{0\}}, \neg p_3^{\{2,3\}}, p_4^{\{1,3\}}] & \\ 6 : [\neg p_1^{\{1,2\}}, p_3^{\{0\}}, p_4^{\{1,3\}}] & \end{array}\right)$$

134 : Asym, 4 symbols, 32 literals
Conj Res : 5x2:0, 5x3:4, 2x3:1, 0x1:2, 0x4:5

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{3\}}, p_4^{\{1,2\}}] & \\ 1 : [p_2^{\{3\}}, p_3^{\{0\}}, p_4^{\{1,2\}}] & \\ 2 : [p_1^{\{0\}}, p_2^{\{3\}}, \neg p_3^{\{1,2\}}] & 0 : \langle p_1^{\{0,2\}}, \neg p_2^{\{4\}}, p_3^{\{1,6\}}, \neg p_4^{\{3,5\}} \rangle \\ 3 : [p_2^{\{3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_2^{\{4\}}, \neg p_3^{\{2,3,5\}}, p_4^{\{0,1,6\}} \rangle \\ 4 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{4,5,6\}}, \neg p_3^{\{2,3,5\}}, p_4^{\{0,1,6\}} \rangle \\ 5 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & 3 : \langle \neg p_1^{\{4,5,6\}}, p_2^{\{0,1,2,3\}} \rangle \\ 6 : [\neg p_1^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1,2\}}] & \end{array}\right)$$

135 : Asym, 4 symbols, 32 literals, symm syms : $(p_4, p_3)$
Conj Res : 3x4:5, 2x5:3, 1x4:6, 1x2:0, 0x3:2, 0x6:1
Disj Res : 3x1:2

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,4\}}] & \\ 1 : [p_2^{\{1,3\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_2^{\{0,3\}}, p_3^{\{4,5\}}, \neg p_4^{\{1,2\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{0,2,4\}}, p_2^{\{1,5\}}, p_4^{\{3,4,5\}} \rangle \\ 3 : [\neg p_2^{\{0,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{1,2,4\}}] & 2 : \langle \neg p_1^{\{0,2,4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{3,4,5\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3\}}, p_3^{\{0\}}, p_4^{\{1,2,4\}}] & 3 : \langle \neg p_1^{\{0,2,4\}}, p_2^{\{1,5\}}, \neg p_3^{\{1,2,3\}} \rangle \\ 5 : [p_2^{\{1,3\}}, p_3^{\{0\}}, p_4^{\{1,2,4\}}] & 4 : \langle \neg p_2^{\{0,3\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{3,4,5\}} \rangle \end{array}\right)$$

136 : Asym, 4 symbols, 32 literals, pures : $p_1$, symm syms : $(p_4, p_3)$
Conj Res : 5x0:4, 1x0:2
Disj Res : 3x4:2, 1x4:2

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{3,4\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{1,2\}}] & 0 : \langle p_1^{\{2,3\}}, \neg p_2^{\{4,5\}}, \neg p_3^{\{0,1,3\}} \rangle \\ 1 : [p_2^{\{3,4\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{1,2\}}] & 1 : \langle p_1^{\{2,3\}}, \neg p_2^{\{4,5\}}, \neg p_4^{\{0,1,2\}} \rangle \\ 2 : [p_1^{\{0,1\}}, p_2^{\{3,4\}}, \neg p_4^{\{1,2\}}] & 2 : \langle \neg p_2^{\{4,5\}}, \neg p_3^{\{0,1,3\}}, \neg p_4^{\{0,1,2\}} \rangle \\ 3 : [p_1^{\{0,1\}}, p_2^{\{3,4\}}, \neg p_3^{\{0,2\}}] & 3 : \langle \neg p_1^{\{0,4\}}, p_2^{\{1,2,3\}}, p_3^{\{5\}} \rangle \\ 4 : [\neg p_1^{\{3,4\}}, \neg p_2^{\{0,1,2\}}] & 4 : \langle \neg p_1^{\{0,4\}}, p_2^{\{1,2,3\}}, p_4^{\{5\}} \rangle \\ 5 : [\neg p_2^{\{0,1,2\}}, p_3^{\{3\}}, p_4^{\{4\}}] & \end{array}\right)$$

137 : Asym, 4 symbols, 32 literals, symm syms : $(p_4, p_3)$
Conj Res : 3x0:1, 2x0:1, 1x4:0

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{3,4\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{1,2\}}] & 0 : \langle p_1^{\{2,3\}}, \neg p_2^{\{4,5\}}, \neg p_3^{\{0,1,5\}} \rangle \\ 1 : [p_2^{\{3,4\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{1,2\}}] & 1 : \langle p_1^{\{2,3\}}, \neg p_2^{\{4,5\}}, \neg p_4^{\{0,1,2\}} \rangle \\ 2 : [p_1^{\{0,1\}}, p_2^{\{3,4\}}, \neg p_4^{\{1,2\}}] & 2 : \langle \neg p_2^{\{4,5\}}, p_3^{\{3\}}, \neg p_4^{\{0,1,2\}} \rangle \\ 3 : [p_1^{\{0,1\}}, p_2^{\{3,4\}}, p_3^{\{2\}}] & 3 : \langle \neg p_1^{\{0,4\}}, p_2^{\{1,2,3\}}, \neg p_3^{\{0,1,5\}} \rangle \\ 4 : [\neg p_1^{\{3,4\}}, \neg p_2^{\{0,1,2\}}] & 4 : \langle \neg p_1^{\{0,4\}}, p_2^{\{1,2,3\}}, p_4^{\{5\}} \rangle \\ 5 : [\neg p_2^{\{0,1,2\}}, \neg p_3^{\{0,3\}}, p_4^{\{4\}}] & \end{array}\right)$$

138 : Asym, 4 symbols, 32 literals
Conj Res : 3x1:2, 2x0:1, 1x4:0
Disj Res : 2x0:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{5\}}, p_2^{\{1\}}, p_3^{\{0,3\}}, \neg p_4^{\{0,2,4\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{0,2\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4,5\}}, p_3^{\{0,3\}}, p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0\}}, \neg p_3^{\{2,3\}}, p_4^{\{1\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{1,4,5\}}, \neg p_4^{\{0,2,4\}}] & 2 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{1,2,4\}}, \neg p_4^{\{0,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{1,4,5\}}] & 3 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{1,2,4\}}, p_3^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{2,3,4,5\}}] & 4 : \langle \neg p_2^{\{1,2,4\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{0,2\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2,4\}}, \neg p_3^{\{2,3\}} \rangle \end{array}\right)$$

139 : Asym, 4 symbols, 33 literals
Disj Res : 5x2:4, 3x4:2, 0x4:2

$$\left(\begin{array}{ll} & 0 : \langle \neg p_2^{\{1,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}} \rangle \\ 0 : [p_2^{\{1,2\}}, p_3^{\{3,4\}}, \neg p_4^{\{0,5,6\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\ 1 : [\neg p_2^{\{0,3,6\}}, \neg p_3^{\{0,1,5\}}, p_4^{\{2,4\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3,4,5,6\}}, \neg p_3^{\{0,1,5\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,4,5,6\}}, \neg p_4^{\{0,5,6\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,4,5,6\}}, \neg p_2^{\{0,3,6\}}] & 5 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,3\}} \rangle \\ & 6 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle \end{array}\right)$$

140 : Asym, 4 symbols, 33 literals, pures : $p_1$, symm syms : $(p_3, p_2)$
Disj Res : 4x1:2, 4x6:3, 3x0:6, 3x5:6, 2x3:4, 2x5:1, 1x0:5, 1x6:5

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{1,2\}}] & \\
1 : [\neg p_2^{\{2,3\}}, p_3^{\{0,2\}}, \neg p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{0,3,4\}}, p_2^{\{5,6\}}, p_3^{\{1,6\}}, p_4^{\{2,6\}} \rangle \\
2 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{1,3\}}, p_4^{\{0,3\}}] & 1 : \langle p_2^{\{5,6\}}, \neg p_3^{\{2,3,4,5\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\
3 : [\neg p_1^{\{0\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{1,2\}}] & 2 : \langle \neg p_2^{\{0,1,2,4\}}, p_3^{\{1,6\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\
4 : [\neg p_1^{\{0\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{1,3\}}] & 3 : \langle \neg p_2^{\{0,1,2,4\}}, \neg p_3^{\{2,3,4,5\}}, p_4^{\{2,6\}} \rangle \\
5 : [p_2^{\{0,1\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{1,2\}}] & \\
6 : [p_2^{\{0,1\}}, p_3^{\{0,2\}}, p_4^{\{0,3\}}] &
\end{array}\right)$$

141 : Asym, 4 symbols, 34 literals, pures : $p_1$, symm syms : $(p_2, p_4, p_3)$
Conj Res : 5x0:3, 5x4:3, 2x0:4, 2x3:4, 1x3:0, 1x4:0

$$\left(\begin{array}{ll}
 & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{1,3\}} \rangle \\
0 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_3^{\{3,4\}}, p_4^{\{5,6\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_4^{\{1,3\}} \rangle \\
1 : [\neg p_2^{\{0,4,6\}}, \neg p_3^{\{0,2,5\}}, \neg p_4^{\{0,1,3\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\
2 : [\neg p_1^{\{1,2,3,4,5,6\}}, \neg p_3^{\{0,2,5\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,3\}} \rangle \\
3 : [\neg p_1^{\{1,2,3,4,5,6\}}, \neg p_4^{\{0,1,3\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_3^{\{0\}} \rangle \\
4 : [\neg p_1^{\{1,2,3,4,5,6\}}, \neg p_2^{\{0,4,6\}}] & 5 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,2\}}, p_4^{\{0\}} \rangle \\
 & 6 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,4\}}, p_4^{\{0\}} \rangle
\end{array}\right)$$

142 : Asym, 4 symbols, 35 literals, symm syms : $(p_3, p_4, p_2)$
Disj Res : 6x3:4, 5x1:2, 4x5:6, 3x2:1, 2x6:5, 1x4:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,1,3,4\}}, p_3^{\{0,2\}}, p_4^{\{0,5\}}] & 0 : \langle \neg p_1^{\{0,2,3\}}, p_2^{\{1\}}, p_3^{\{0,4\}}, p_4^{\{0,5\}} \rangle \\
1 : [p_2^{\{0\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{1,2,4\}}] & 1 : \langle \neg p_1^{\{0,2,3\}}, \neg p_2^{\{3,4,5\}}, \neg p_4^{\{1,2,4\}} \rangle \\
2 : [\neg p_1^{\{0,1,3,4\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{1,2,4\}}] & 2 : \langle \neg p_2^{\{3,4,5\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,2,4\}} \rangle \\
3 : [\neg p_1^{\{0,1,3,4\}}, \neg p_2^{\{1,2,3,5\}}] & 3 : \langle \neg p_1^{\{0,2,3\}}, \neg p_2^{\{3,4,5\}}, \neg p_3^{\{1,2,5\}} \rangle \\
4 : [\neg p_2^{\{1,2,3,5\}}, p_3^{\{0,2\}}, \neg p_4^{\{1,2,4\}}] & 4 : \langle \neg p_1^{\{0,2,3\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{1,2,4\}} \rangle \\
5 : [\neg p_2^{\{1,2,3,5\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{0,5\}}] & 5 : \langle \neg p_2^{\{3,4,5\}}, \neg p_3^{\{1,2,5\}}, p_4^{\{0,5\}} \rangle
\end{array}\right)$$

143 : Asym, 4 symbols, 36 literals, pures : $p_1$, symm syms : $(p_4, p_3)$
Conj Res : 1x3:2
Disj Res : 5x1:3, 5x4:3, 2x3:1, 2x4:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{0\}}, p_2^{\{1,2\}}, p_4^{\{3,4,5\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{2,3\}}, p_3^{\{1,5\}}, \neg p_4^{\{2,4\}} \rangle \\
1 : [p_2^{\{1,2\}}, p_3^{\{0\}}, p_4^{\{3,4,5\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, \neg p_4^{\{2,4\}} \rangle \\
2 : [\neg p_2^{\{0,3,4\}}, \neg p_3^{\{2,4,5\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, \neg p_3^{\{2,4\}} \rangle \\
3 : [\neg p_1^{\{1,2,3,5\}}, \neg p_2^{\{0,3,4\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{2,3\}}, p_4^{\{0,1,5\}} \rangle \\
4 : [\neg p_1^{\{1,2,3,5\}}, \neg p_3^{\{2,4,5\}}, \neg p_4^{\{0,1\}}] & 4 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{2,4\}}, p_4^{\{0,1,5\}} \rangle \\
5 : [\neg p_1^{\{1,2,3,5\}}, p_3^{\{0\}}, p_4^{\{3,4,5\}}] & 5 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{2,4\}}, p_4^{\{0,1,5\}} \rangle
\end{array}\right)$$

144 : Asym, 4 symbols, 36 literals
Conj Res : 1x3:5, 0x5:1
Disj Res : 5x1:2, 2x3:5, 2x4:5

$$\left(\begin{array}{ll}
0 : [p_1^{\{2\}}, p_2^{\{0,1\}}, \neg p_4^{\{3,4,5\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, p_4^{\{2,4\}} \rangle \\
1 : [p_2^{\{0,1\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{3,4,5\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,2,5\}} \rangle \\
2 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,2,5\}}, p_4^{\{0,2\}}] & 2 : \langle p_1^{\{0\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{1,2,5\}}, p_4^{\{2,4\}} \rangle \\
3 : [\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{2,3,4\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{0,1,5\}} \rangle \\
4 : [\neg p_1^{\{0,1,3,5\}}, p_3^{\{4\}}, p_4^{\{0,2\}}] & 4 : \langle \neg p_2^{\{2,3\}}, p_3^{\{4\}}, \neg p_4^{\{0,1,5\}} \rangle \\
5 : [\neg p_1^{\{0,1,3,5\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{3,4,5\}}] & 5 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{0,1,5\}} \rangle
\end{array}\right)$$

145 : Asym, 4 symbols, 36 literals
Conj Res : 1x3:5, 0x5:1
Disj Res : 4x5:3, 1x3:5, 0x5:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{2,4,5\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{3,4,5\}}, p_3^{\{1,4\}}, \neg p_4^{\{2,5\}} \rangle \\
1 : [\neg p_1^{\{1,2,3,4\}}, p_3^{\{0,1\}}, p_4^{\{2,4,5\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_2^{\{0\}}, p_3^{\{1,4\}}, \neg p_4^{\{2,5\}} \rangle \\
2 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{3,4,5\}}, p_4^{\{0,1,4\}} \rangle \\
3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,2,3,5\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{3,4,5\}}, \neg p_3^{\{0,2,5\}} \rangle \\
4 : [\neg p_2^{\{0,2,3,5\}}, p_3^{\{0,1\}}, p_4^{\{2,4,5\}}] & 4 : \langle \neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{0,1,4\}} \rangle \\
5 : [\neg p_2^{\{0,2,3,5\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{0,1\}}] & 5 : \langle \neg p_2^{\{3,4,5\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{0,1,4\}} \rangle
\end{array}\right)$$

146 : Asym, 4 symbols, 38 literals, symm syms : $(p_3, p_4)(p_1, p_2)$

$$\left(\begin{array}{ll}
0 : [p_1^{\{1,5\}}, p_2^{\{0,3\}}, \neg p_4^{\{1,2,4\}}] & \\
1 : [\neg p_1^{\{0,2,3\}}, \neg p_2^{\{1,4,5\}}] & 0 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0,5,6\}}, p_4^{\{3,4\}} \rangle \\
2 : [\neg p_1^{\{0,2,3\}}, \neg p_3^{\{2,3,4,5\}}, \neg p_4^{\{1,2,4\}}] & 1 : \langle p_1^{\{0,3,6\}}, \neg p_2^{\{1,4\}}, \neg p_4^{\{0,2,5\}} \rangle \\
3 : [p_1^{\{1,5\}}, \neg p_3^{\{2,3,4,5\}}, p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{1,2\}}, \neg p_3^{\{2,3,4,5,6\}}, \neg p_4^{\{0,2,5\}} \rangle \\
4 : [\neg p_2^{\{1,4,5\}}, \neg p_3^{\{2,3,4,5\}}, p_4^{\{0\}}] & 3 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0,5,6\}}, \neg p_3^{\{2,3,4,5,6\}} \rangle \\
5 : [p_2^{\{0,3\}}, \neg p_3^{\{2,3,4,5\}}, \neg p_4^{\{1,2,4\}}] & 4 : \langle \neg p_2^{\{1,4\}}, \neg p_3^{\{2,3,4,5,6\}}, \neg p_4^{\{0,2,5\}} \rangle \\
6 : [p_1^{\{1,5\}}, p_2^{\{0,3\}}, \neg p_3^{\{2,3,4,5\}}] & 5 : \langle p_1^{\{0,3,6\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{2,3,4,5,6\}} \rangle
\end{array}\right)$$

147 : Asym, 4 symbols, 38 literals, pures : $p_3$
Conj Res : 6x4:3, 6x2:5, 5x1:2, 3x0:6, 3x5:6, 3x1:4, 0x2:5
Disj Res : 5x2:4, 3x4:2, 1x2:4, 0x2:3

$$\left(\begin{array}{ll}
0 : [p_1^{\{0,5\}}, p_2^{\{1,4\}}, p_3^{\{0,2\}}, \neg p_4^{\{0,3\}}] & 0 : \langle p_1^{\{0,2\}}, \neg p_2^{\{1,3\}}, p_3^{\{0,5\}}, \neg p_4^{\{0,4\}} \rangle \\
1 : [\neg p_2^{\{0,5\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{1,2,5\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0\}}, p_4^{\{1,2,5\}} \rangle \\
2 : [p_1^{\{0,5\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{1,2,5\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,5\}}, p_4^{\{1,2,5\}} \rangle \\
3 : [\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,5\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,4\}} \rangle \\
4 : [\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{0,3\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0\}}, \neg p_3^{\{1,2,4\}} \rangle \\
5 : [\neg p_1^{\{1,2,3,4\}}, p_3^{\{0,2\}}, p_4^{\{1,2,5\}}] & 5 : \langle p_1^{\{0,2\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2,4\}}, p_4^{\{1,2,5\}} \rangle
\end{array}\right)$$

148 : Asym, 4 symbols, 38 literals, symm syms : $(p_4, p_3)$
Conj Res : 2x3:1
Disj Res : 2x4:1, 1x3:4

$$\left(\begin{array}{ll}
0 : [p_2^{\{4,5\}}, \neg p_3^{\{0,1,3\}}, \neg p_4^{\{2\}}] & \\
1 : [p_1^{\{2,3\}}, p_2^{\{4,5\}}, \neg p_3^{\{0,1,3\}}] & 0 : \langle \neg p_2^{\{4,5\}}, \neg p_3^{\{0,1,6\}}, p_4^{\{2,3,4\}} \rangle \\
2 : [p_1^{\{2,3\}}, p_2^{\{4,5\}}, p_4^{\{0,1,5\}}] & 1 : \langle \neg p_1^{\{5,6\}}, \neg p_3^{\{0,1,6\}}, p_4^{\{2,3,4\}} \rangle \\
3 : [p_1^{\{2,3\}}, p_3^{\{4\}}, p_4^{\{0,1,5\}}] & 2 : \langle p_1^{\{1,2,3\}}, \neg p_2^{\{4,5\}}, \neg p_4^{\{0,6\}} \rangle \\
4 : [\neg p_2^{\{0,2,3\}}, p_3^{\{4\}}, p_4^{\{0,1,5\}}] & 3 : \langle p_1^{\{1,2,3\}}, \neg p_2^{\{4,5\}}, \neg p_3^{\{0,1,6\}} \rangle \\
5 : [\neg p_1^{\{1,4,5\}}, \neg p_2^{\{0,2,3\}}] & 4 : \langle \neg p_1^{\{5,6\}}, p_2^{\{0,1,2\}}, p_3^{\{3,4\}} \rangle \\
6 : [\neg p_1^{\{1,4,5\}}, \neg p_3^{\{0,1,3\}}, \neg p_4^{\{2\}}] & 5 : \langle \neg p_1^{\{5,6\}}, p_2^{\{0,1,2\}}, p_4^{\{2,3,4\}} \rangle
\end{array}\right)$$

149 : Asym, 4 symbols, 38 literals, symm syms : $(p_4, p_3)(p_2, p_1)$
Conj Res : 3x5:4, 3x1:2, 2x0:1, 2x4:3, 1x6:0, 0x5:6
Disj Res : 5x0:1, 4x1:5, 3x1:0, 0x2:3

$$\left(\begin{array}{ll}
0 : [p_1^{\{2,5\}}, p_2^{\{1,3\}}, \neg p_3^{\{3,4,5\}}, p_4^{\{0,5\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{2,3\}}, p_3^{\{1,4\}}, p_4^{\{0,4\}} \rangle \\
1 : [p_1^{\{2,5\}}, p_2^{\{1,3\}}, p_3^{\{0,2\}}, \neg p_4^{\{1,2,4\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, \neg p_4^{\{1,2,5\}} \rangle \\
2 : [\neg p_2^{\{0,2,5\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{1,2,4\}}] & 2 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, p_3^{\{1,4\}}, \neg p_4^{\{1,2,5\}} \rangle \\
3 : [\neg p_1^{\{0,1,3,4\}}, \neg p_2^{\{0,2,5\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{0,1\}}, \neg p_3^{\{0,2,5\}} \rangle \\
4 : [\neg p_1^{\{0,1,3,4\}}, p_3^{\{0,2\}}, p_4^{\{0,5\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2,5\}}, \neg p_4^{\{1,2,5\}} \rangle \\
5 : [\neg p_1^{\{0,1,3,4\}}, \neg p_3^{\{3,4,5\}}, \neg p_4^{\{1,2,4\}}] & 5 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{0,4\}} \rangle
\end{array}\right)$$

150 : Asym, 4 symbols, 40 literals, symm syms : $(p_3, p_4)$

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{0,4\}}, \neg p_4^{\{0,1\}}] & \\
1 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{1,2,4\}}, \neg p_3^{\{0,4\}}] & 0 : \langle p_2^{\{6,7\}}, \neg p_3^{\{0,1,4,5\}}, \neg p_4^{\{0,2,3\}} \rangle \\
2 : [\neg p_2^{\{1,2,4\}}, p_3^{\{1,3\}}, \neg p_4^{\{0,1\}}] & 1 : \langle p_1^{\{5,6\}}, \neg p_2^{\{1,2,3,4\}}, p_3^{\{2,7\}}, \neg p_4^{\{0,2,3\}} \rangle \\
3 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{1,2,4\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{0,1,3\}}, \neg p_2^{\{1,2,3,4\}}, p_4^{\{4,5,6,7\}} \rangle \\
4 : [\neg p_2^{\{1,2,4\}}, \neg p_3^{\{0,4\}}, p_4^{\{2,3,4\}}] & 3 : \langle \neg p_1^{\{0,1,3\}}, p_3^{\{2,7\}}, p_4^{\{4,5,6,7\}} \rangle \\
5 : [p_1^{\{1\}}, \neg p_3^{\{0,4\}}, p_4^{\{2,3,4\}}] & 4 : \langle \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{0,1,4,5\}}, p_4^{\{4,5,6,7\}} \rangle \\
6 : [p_1^{\{1\}}, p_2^{\{0\}}, p_4^{\{2,3,4\}}] & \\
7 : [p_2^{\{0\}}, p_3^{\{1,3\}}, p_4^{\{2,3,4\}}] &
\end{array}\right)$$

151 : Asym, 4 symbols, 40 literals
Conj Res : 7x5:6, 6x4:5, 5x1:4, 4x0:1, 4x3:1, 2x0:3, 2x1:3
Disj Res : 3x4:2

$$\left(\begin{array}{ll}
0 : [p_1^{\{1,3\}}, \neg p_3^{\{2,3\}}, p_4^{\{0\}}] & \\
1 : [p_1^{\{1,3\}}, p_2^{\{0\}}, \neg p_3^{\{2,3\}}] & \\
2 : [p_2^{\{0\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,3\}}] & \\
3 : [\neg p_1^{\{0\}}, \neg p_3^{\{2,3\}}, \neg p_4^{\{1,3\}}] & 0 : \langle \neg p_1^{\{3,8,9\}}, p_2^{\{1,2\}}, p_3^{\{6,7\}}, p_4^{\{0,4,5\}} \rangle \\
4 : [\neg p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}, p_4^{\{0\}}] & 1 : \langle p_1^{\{0,1,5,7\}}, \neg p_2^{\{4,5,6,7,8,9\}}, \neg p_4^{\{2,3,6,9\}} \rangle \\
5 : [p_1^{\{1,3\}}, \neg p_2^{\{1,2\}}, p_4^{\{0\}}] & 2 : \langle \neg p_2^{\{4,5,6,7,8,9\}}, \neg p_3^{\{0,1,2,3,4,8\}} \rangle \\
6 : [\neg p_2^{\{1,2\}}, p_3^{\{0\}}, \neg p_4^{\{1,3\}}] & 3 : \langle p_1^{\{0,1,5,7\}}, \neg p_3^{\{0,1,2,3,4,8\}}, \neg p_4^{\{2,3,6,9\}} \rangle \\
7 : [p_1^{\{1,3\}}, \neg p_2^{\{1,2\}}, p_3^{\{0\}}] & \\
8 : [\neg p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{2,3\}}] & \\
9 : [\neg p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_4^{\{1,3\}}] &
\end{array}\right)$$

152 : Asym, 4 symbols, 42 literals, symm syms : $(p_4, p_1)(p_3, p_2)$
Conj Res : 7x0:5, 7x4:5, 7x9:6, 6x3:9, 6x8:9, 5x6:7, 5x8:4, 4x3:8, 4x9:8, 2x8:3, 2x9:3, 1x3:2, 1x4:0, 1x5:0, 0x8:4, 0x2:1

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0\}}, \neg p_2^{\{2,3,4\}}, \neg p_4^{\{1,3,4\}}] & \\
1 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,3,4\}}] & \\
2 : [p_1^{\{1,2,3\}}, \neg p_2^{\{2,3,4\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{0,7,8\}}, p_3^{\{1,3,4\}}, p_4^{\{2,5,6\}} \rangle \\
3 : [p_1^{\{1,2,3\}}, p_3^{\{0\}}, \neg p_4^{\{1,3,4\}}] & 1 : \langle p_1^{\{2,3,4,6\}}, \neg p_3^{\{5,6,7,8\}}, \neg p_4^{\{0,1,3,8\}} \rangle \\
4 : [p_1^{\{1,2,3\}}, \neg p_2^{\{2,3,4\}}, p_3^{\{0\}}] & 2 : \langle p_1^{\{2,3,4,6\}}, \neg p_2^{\{0,1,2,4,5,7\}}, \neg p_3^{\{5,6,7,8\}} \rangle \\
5 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,2,4\}}, p_4^{\{0\}}] & 3 : \langle p_1^{\{2,3,4,6\}}, \neg p_2^{\{0,1,2,4,5,7\}}, \neg p_4^{\{0,1,3,8\}} \rangle \\
6 : [p_1^{\{1,2,3\}}, \neg p_3^{\{1,2,4\}}, p_4^{\{0\}}] & 4 : \langle \neg p_2^{\{0,1,2,4,5,7\}}, \neg p_3^{\{5,6,7,8\}}, \neg p_4^{\{0,1,3,8\}} \rangle \\
7 : [\neg p_1^{\{0\}}, \neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,2,4\}}] & \\
8 : [\neg p_1^{\{0\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{1,3,4\}}] &
\end{array}\right)$$

153 : Asym, 4 symbols, 42 literals, pures : $p_2$, symm syms : $(p_1, p_4, p_3)$
Conj Res : 6x7:5, 5x0:7, 5x8:7, 4x0:1, 4x5:2, 4x6:2, 3x0:1, 2x7:5, 2x1:4, 2x3:4, 1x7:0, 1x8:0

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_4^{\{2,3,4\}}] & \\
1 : [\neg p_2^{\{1,4\}}, p_3^{\{0\}}, \neg p_4^{\{2,3,4\}}] & \\
2 : [\neg p_2^{\{1,4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{0,3,4\}}, p_3^{\{1,5,6\}}, p_4^{\{2,7,8\}} \rangle \\
3 : [\neg p_1^{\{0\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{2,3,4\}}] & 1 : \langle p_1^{\{5,6,7,8\}}, \neg p_2^{\{0,1,2,4\}}, \neg p_3^{\{2,3,4,7\}} \rangle \\
4 : [\neg p_1^{\{0\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{1,2,3\}}] & 2 : \langle p_1^{\{5,6,7,8\}}, \neg p_3^{\{2,3,4,7\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\
5 : [p_1^{\{1,2,4\}}, p_3^{\{0\}}, \neg p_4^{\{2,3,4\}}] & 3 : \langle p_2^{\{6,8\}}, \neg p_3^{\{2,3,4,7\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\
6 : [p_1^{\{1,2,4\}}, p_2^{\{3\}}, p_3^{\{0\}}] & 4 : \langle p_1^{\{5,6,7,8\}}, \neg p_2^{\{0,1,2,4\}}, \neg p_4^{\{0,1,3,5\}} \rangle \\
7 : [p_1^{\{1,2,4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{0\}}] & \\
8 : [p_1^{\{1,2,4\}}, p_2^{\{3\}}, p_4^{\{0\}}] &
\end{array}\right)$$

154 : Asym, 4 symbols, 42 literals, symm syms : $(p_4, p_3)$
Conj Res : 8x5:6, 8x2:7, 7x4:2, 6x7:8, 6x1:5, 5x0:1, 2x0:4, 2x3:4, 1x3:0, 1x4:0
Disj Res : 3x1:2, 3x4:2

$$\left(\begin{array}{ll}
0 : [p_1^{\{4,5\}}, p_3^{\{3,4\}}, p_4^{\{0,1,2\}}] & \\
1 : [p_2^{\{3,5\}}, p_3^{\{3,4\}}, p_4^{\{0,1,2\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{3,5,6\}}, p_4^{\{0,1,2\}} \rangle \\
2 : [p_1^{\{4,5\}}, p_2^{\{3,5\}}, p_4^{\{0,1,2\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{3,4,6\}}, p_4^{\{0,1,2\}} \rangle \\
3 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{0,2,4\}}, \neg p_3^{\{1,2,5\}}] & 2 : \langle \neg p_2^{\{3,5,6\}}, \neg p_3^{\{3,4,6\}}, p_4^{\{0,1,2\}} \rangle \\
4 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{3,4,5\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_3^{\{0,1\}}, \neg p_4^{\{4,5,6\}} \rangle \\
5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{0,2,4\}}, \neg p_4^{\{3,4,5\}}] & 4 : \langle p_1^{\{0,2\}}, \neg p_2^{\{3,5,6\}}, p_3^{\{0,1\}}, \neg p_4^{\{4,5,6\}} \rangle \\
6 : [\neg p_2^{\{0,2,4\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{3,4,5\}}] & 5 : \langle p_1^{\{0,2\}}, p_2^{\{1,2\}}, \neg p_3^{\{3,4,6\}}, \neg p_4^{\{4,5,6\}} \rangle
\end{array}\right)$$

155 : Asym, 4 symbols, 42 literals, symm syms : $(p_1, p_3, p_2)$

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,2\}}, p_2^{\{3\}}, p_3^{\{0,1\}}, p_4^{\{0,4\}}] & \\
1 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,4\}}, \neg p_3^{\{2,3,4\}}] & \\
2 : [p_1^{\{1,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,4\}}] & 0 : \langle \neg p_1^{\{0,1,4,5\}}, p_3^{\{0,6,7\}}, p_4^{\{0,2,3\}} \rangle \\
3 : [\neg p_2^{\{1,4\}}, \neg p_3^{\{2,3,4\}}, p_4^{\{0,4\}}] & 1 : \langle p_1^{\{2,7\}}, \neg p_2^{\{1,3,5,6\}}, p_3^{\{0,6,7\}}, \neg p_4^{\{4,5,6,7\}} \rangle \\
4 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{1,2,3\}}] & 2 : \langle \neg p_1^{\{0,1,4,5\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{4,5,6,7\}} \rangle \\
5 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,4\}}, \neg p_4^{\{1,2,3\}}] & 3 : \langle p_2^{\{0\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{4,5,6,7\}} \rangle \\
6 : [\neg p_2^{\{1,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,2,3\}}] & 4 : \langle p_1^{\{2,7\}}, \neg p_2^{\{1,3,5,6\}}, \neg p_3^{\{1,2,3,4\}}, p_4^{\{0,2,3\}} \rangle \\
7 : [p_1^{\{1,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,2,3\}}] &
\end{array}\right)$$

156 : Asym, 4 symbols, 42 literals, symm syms : $(p_3, p_4)$
Conj Res : 7x5:6, 6x1:5, 6x4:5, 3x4:1, 3x5:1, 2x1:3

$$\left(\begin{array}{ll}
0 : [p_1^{\{0,5\}}, p_2^{\{0,1\}}, p_3^{\{2,3,4\}}] & \\
1 : [\neg p_1^{\{1,2,4\}}, \neg p_3^{\{0,5\}}, \neg p_4^{\{0,3\}}] & 0 : \langle p_1^{\{0,4,6\}}, p_2^{\{0,7\}}, \neg p_3^{\{1,2,5\}}, \neg p_4^{\{1,3\}} \rangle \\
2 : [\neg p_1^{\{1,2,4\}}, \neg p_2^{\{3,4,5\}}, \neg p_3^{\{0,5\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_2^{\{0,7\}}, p_4^{\{4,5,6,7\}} \rangle \\
3 : [\neg p_1^{\{1,2,4\}}, \neg p_2^{\{3,4,5\}}, \neg p_4^{\{0,3\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, p_3^{\{0,6,7\}}, p_4^{\{4,5,6,7\}} \rangle \\
4 : [p_1^{\{0,5\}}, \neg p_2^{\{3,4,5\}}, p_4^{\{1,2,5\}}] & 3 : \langle \neg p_2^{\{2,3,4,5\}}, p_3^{\{0,6,7\}}, \neg p_4^{\{1,3\}} \rangle \\
5 : [\neg p_2^{\{3,4,5\}}, \neg p_3^{\{0,5\}}, p_4^{\{1,2,5\}}] & 4 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{2,3,4,5\}}, p_3^{\{0,6,7\}} \rangle \\
6 : [p_1^{\{0,5\}}, p_3^{\{2,3,4\}}, p_4^{\{1,2,5\}}] & 5 : \langle p_1^{\{0,4,6\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{1,2,5\}}, p_4^{\{4,5,6,7\}} \rangle \\
7 : [p_2^{\{0,1\}}, p_3^{\{2,3,4\}}, p_4^{\{1,2,5\}}] &
\end{array}\right)$$

157 : Asym, 4 symbols, 44 literals, symm syms : $(p_3, p_1)(p_2, p_4)$
Conj Res : 7x4:6, 6x5:4, 5x1:2, 5x3:2, 4x2:5, 0x4:6
Disj Res : 2x3:4, 1x4:2

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{3,4\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,2\}}] & \\
1 : [p_2^{\{3,4\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,2\}}] & \\
2 : [p_1^{\{0,1\}}, p_2^{\{3,4\}}, \neg p_4^{\{1,2\}}] & 0 : \langle p_1^{\{2,5,8\}}, \neg p_2^{\{6,7,8\}}, p_3^{\{0,1,8\}}, p_4^{\{3,4,8\}} \rangle \\
3 : [\neg p_1^{\{3,4\}}, \neg p_3^{\{1,2\}}, p_4^{\{0,3\}}] & 1 : \langle p_1^{\{2,5,8\}}, \neg p_3^{\{3,4,5,7\}}, \neg p_4^{\{0,1,2,6\}} \rangle \\
4 : [p_2^{\{3,4\}}, \neg p_3^{\{1,2\}}, p_4^{\{0,3\}}] & 2 : \langle \neg p_2^{\{6,7,8\}}, \neg p_3^{\{3,4,5,7\}}, \neg p_4^{\{0,1,2,6\}} \rangle \\
5 : [p_1^{\{0,1\}}, p_2^{\{3,4\}}, \neg p_3^{\{1,2\}}] & 3 : \langle \neg p_1^{\{0,3,6,7\}}, p_2^{\{1,2,4,5\}}, p_4^{\{3,4,8\}} \rangle \\
6 : [\neg p_1^{\{3,4\}}, \neg p_2^{\{0,2\}}, \neg p_4^{\{1,2\}}] & 4 : \langle \neg p_1^{\{0,3,6,7\}}, p_2^{\{1,2,4,5\}}, p_3^{\{0,1,8\}} \rangle \\
7 : [\neg p_1^{\{3,4\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{1,2\}}] & \\
8 : [p_1^{\{0,1\}}, \neg p_2^{\{0,2\}}, p_3^{\{0,4\}}, p_4^{\{0,3\}}] &
\end{array}\right)$$

158 : Asym, 4 symbols, 44 literals, symm syms : $(p_3, p_4, p_1, p_2)$
Conj Res : 5x3:4, 4x2:5, 4x7:3, 3x6:7, 2x0:1, 1x6:0, 1x5:2, 0x7:6

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{1,3,5\}}, \neg p_3^{\{0,4\}}, \neg p_4^{\{0,2\}}] & \\
1 : [p_2^{\{0\}}, p_3^{\{1,2,3\}}, p_4^{\{1,4,5\}}] & \\
2 : [p_1^{\{0\}}, p_3^{\{1,2,3\}}, p_4^{\{1,4,5\}}] & 0 : \langle p_1^{\{2,7,8\}}, p_2^{\{1\}}, \neg p_3^{\{0,5,6\}}, \neg p_4^{\{0,3,4\}} \rangle \\
3 : [\neg p_2^{\{2,3,4,5\}}, p_3^{\{1,2,3\}}, \neg p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{0,4,5\}}, p_3^{\{1,2,3,7\}}, p_4^{\{1,2,6,8\}} \rangle \\
4 : [\neg p_1^{\{1,3,5\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_2^{\{3,4,5,6,7,8\}}, p_3^{\{1,2,3,7\}}, \neg p_4^{\{0,3,4\}} \rangle \\
5 : [\neg p_1^{\{1,3,5\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{0,4\}}] & 3 : \langle \neg p_1^{\{0,4,5\}}, \neg p_2^{\{3,4,5,6,7,8\}}, p_3^{\{1,2,3,7\}} \rangle \\
6 : [\neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{0,4\}}, p_4^{\{1,4,5\}}] & 4 : \langle \neg p_2^{\{3,4,5,6,7,8\}}, \neg p_3^{\{0,5,6\}}, p_4^{\{1,2,6,8\}} \rangle \\
7 : [p_1^{\{0\}}, \neg p_2^{\{2,3,4,5\}}, p_3^{\{1,2,3\}}] & 5 : \langle \neg p_1^{\{0,4,5\}}, \neg p_2^{\{3,4,5,6,7,8\}}, p_4^{\{1,2,6,8\}} \rangle \\
8 : [p_1^{\{0\}}, \neg p_2^{\{2,3,4,5\}}, p_4^{\{1,4,5\}}] &
\end{array}\right)$$

159 : Asym, 4 symbols, 46 literals, symm syms : $(p_3, p_4)$
Conj Res : 8x5:6, 8x3:7, 7x4:3, 7x6:8, 6x0:5, 6x4:5, 3x0:4, 3x5:4, 2x6:8, 2x3:7, 1x7:2, 1x8:2
Disj Res : 5x2:3, 3x4:5, 1x4:5, 1x2:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{1,3,4\}}, p_2^{\{0\}}, p_3^{\{1,5\}}, p_4^{\{1,2,3\}}] & \\
1 : [p_1^{\{0,5\}}, \neg p_3^{\{0,2,4\}}, p_4^{\{1,2,3\}}] & \\
2 : [\neg p_1^{\{1,3,4\}}, \neg p_3^{\{0,2,4\}}, \neg p_4^{\{0,5\}}] & 0 : \langle p_1^{\{1,5,6\}}, p_2^{\{0\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{2,7,8\}} \rangle \\
3 : [\neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{0,2,4\}}, p_4^{\{1,2,3\}}] & 1 : \langle \neg p_1^{\{0,2,4,7\}}, p_3^{\{0,6,8\}}, p_4^{\{0,1,3,5\}} \rangle \\
4 : [\neg p_1^{\{1,3,4\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{0,2,4\}}] & 2 : \langle \neg p_2^{\{3,4,5,6,7,8\}}, \neg p_3^{\{1,2,3,4\}}, p_4^{\{0,1,3,5\}} \rangle \\
5 : [p_1^{\{0,5\}}, \neg p_2^{\{2,3,4,5\}}, p_4^{\{1,2,3\}}] & 3 : \langle \neg p_1^{\{0,2,4,7\}}, \neg p_2^{\{3,4,5,6,7,8\}}, p_4^{\{0,1,3,5\}} \rangle \\
6 : [p_1^{\{0,5\}}, \neg p_2^{\{2,3,4,5\}}, p_3^{\{1,5\}}] & 4 : \langle \neg p_1^{\{0,2,4,7\}}, \neg p_2^{\{3,4,5,6,7,8\}}, \neg p_3^{\{1,2,3,4\}} \rangle \\
7 : [\neg p_1^{\{1,3,4\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_4^{\{0,5\}}] & 5 : \langle p_1^{\{1,5,6\}}, \neg p_2^{\{3,4,5,6,7,8\}}, p_3^{\{0,6,8\}}, \neg p_4^{\{2,7,8\}} \rangle \\
8 : [\neg p_2^{\{2,3,4,5\}}, p_3^{\{1,5\}}, \neg p_4^{\{0,5\}}] &
\end{array}\right)$$

160 : Asym, 4 symbols, 48 literals, symm syms : $(p_1, p_4)$
Conj Res : 8x2:7, 8x4:7, 6x7:8, 6x1:5, 6x3:5, 5x4:3, 5x8:6, 3x2:4, 3x7:4, 1x4:3
Disj Res : 1x2:3, 1x4:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,3,5\}}, p_2^{\{0,1\}}, p_3^{\{0,2\}}, p_4^{\{0,4\}}] & \\
1 : [p_2^{\{0,1\}}, \neg p_3^{\{1,4,5\}}, \neg p_4^{\{1,2,3\}}] & \\
2 : [\neg p_1^{\{0,3,5\}}, \neg p_3^{\{1,4,5\}}, \neg p_4^{\{1,2,3\}}] & \\
3 : [\neg p_2^{\{2,3,4,5\}}, p_3^{\{0,2\}}, \neg p_4^{\{1,2,3\}}] & \\
4 : [p_1^{\{1\}}, \neg p_2^{\{2,3,4,5\}}, p_3^{\{0,2\}}] & \\
5 : [p_1^{\{1\}}, \neg p_2^{\{2,3,4,5\}}, p_4^{\{0,4\}}] & \\
6 : [\neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{1,4,5\}}, p_4^{\{0,4\}}] & \\
7 : [\neg p_1^{\{0,3,5\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_4^{\{1,2,3\}}] & \\
8 : [\neg p_1^{\{0,3,5\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{1,4,5\}}] & \\
\end{array}\right.$$
$$\left.\begin{array}{l}
0 : \langle \neg p_1^{\{0,2,7,8\}}, p_2^{\{0,1\}}, p_3^{\{0,3,4\}}, p_4^{\{0,5,6\}} \rangle \\
1 : \langle p_1^{\{4,5\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,2,6,8\}}, \neg p_4^{\{1,2,3,7\}} \rangle \\
2 : \langle \neg p_2^{\{3,4,5,6,7,8\}}, p_3^{\{0,3,4\}}, \neg p_4^{\{1,2,3,7\}} \rangle \\
3 : \langle \neg p_1^{\{0,2,7,8\}}, \neg p_2^{\{3,4,5,6,7,8\}}, \neg p_4^{\{1,2,3,7\}} \rangle \\
4 : \langle \neg p_2^{\{3,4,5,6,7,8\}}, \neg p_3^{\{1,2,6,8\}}, p_4^{\{0,5,6\}} \rangle \\
5 : \langle \neg p_1^{\{0,2,7,8\}}, \neg p_2^{\{3,4,5,6,7,8\}}, \neg p_3^{\{1,2,6,8\}} \rangle
\end{array}\right)$$

161 : Asym, 4 symbols, 48 literals, symm syms : $(p_4, p_3)$
Conj Res : 6x2:8, 6x7:8, 5x3:4, 5x8:6, 4x6:5, 4x7:3, 3x2:7, 3x8:7, 1x7:2, 1x8:2
Disj Res : 4x3:5, 2x5:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2,5\}}, \neg p_4^{\{0,1,5\}}] & \\
1 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, \neg p_3^{\{0,2,5\}}] & \\
2 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{1,2,5\}}, \neg p_4^{\{0,1,5\}}] & \\
3 : [\neg p_2^{\{1,2,5\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{2,3,4\}}] & \\
4 : [\neg p_1^{\{3,4,5\}}, p_2^{\{0,3\}}, p_3^{\{1,4\}}, p_4^{\{2,3,4\}}] & \\
5 : [p_1^{\{0,1,2\}}, \neg p_3^{\{0,2,5\}}, p_4^{\{2,3,4\}}] & \\
6 : [p_1^{\{0,1,2\}}, \neg p_2^{\{1,2,5\}}, p_4^{\{2,3,4\}}] & \\
7 : [p_1^{\{0,1,2\}}, p_2^{\{0,3\}}, p_3^{\{1,4\}}, \neg p_4^{\{0,1,5\}}] & \\
\end{array}\right.$$
$$\left.\begin{array}{l}
0 : \langle p_1^{\{5,6,7\}}, p_2^{\{4,7\}}, \neg p_3^{\{0,1,3,5\}}, \neg p_4^{\{0,2,7\}} \rangle \\
1 : \langle p_1^{\{5,6,7\}}, \neg p_2^{\{1,2,3,6\}}, p_3^{\{4,7\}}, \neg p_4^{\{0,2,7\}} \rangle \\
2 : \langle p_1^{\{5,6,7\}}, \neg p_2^{\{1,2,3,6\}}, \neg p_3^{\{0,1,3,5\}}, p_4^{\{3,4,5,6\}} \rangle \\
3 : \langle \neg p_1^{\{0,1,2,4\}}, p_2^{\{4,7\}}, p_4^{\{3,4,5,6\}} \rangle \\
4 : \langle \neg p_1^{\{0,1,2,4\}}, p_3^{\{4,7\}}, p_4^{\{3,4,5,6\}} \rangle \\
5 : \langle \neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{1,2,3,6\}}, \neg p_3^{\{0,1,3,5\}}, \neg p_4^{\{0,2,7\}} \rangle
\end{array}\right)$$

162 : Asym, 4 symbols, 48 literals, symm syms : $(p_3, p_2)(p_1, p_4)$
Conj Res : 6x1:3, 5x1:3, 3x0:1, 3x2:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{2,3,6\}}, p_2^{\{0,4,6\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{1,3,4\}}] & \\
1 : [p_1^{\{2,3,6\}}, \neg p_2^{\{1,2,3,5\}}, p_3^{\{0,1,2\}}, p_4^{\{1,3,4\}}] & \\
2 : [\neg p_1^{\{0,1,4,5\}}, \neg p_2^{\{1,2,3,5\}}, \neg p_3^{\{3,4,5,6\}}] & \\
3 : [\neg p_1^{\{0,1,4,5\}}, p_2^{\{0,4,6\}}, p_3^{\{0,1,2\}}, p_4^{\{1,3,4\}}] & \\
4 : [\neg p_2^{\{1,2,3,5\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,2,5,6\}}] & \\
5 : [\neg p_1^{\{0,1,4,5\}}, \neg p_2^{\{1,2,3,5\}}, \neg p_4^{\{0,2,5,6\}}] & \\
6 : [\neg p_1^{\{0,1,4,5\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,2,5,6\}}] & \\
7 : [p_1^{\{2,3,6\}}, p_2^{\{0,4,6\}}, p_3^{\{0,1,2\}}, \neg p_4^{\{0,2,5,6\}}] & \\
\end{array}\right.$$
$$\left.\begin{array}{l}
0 : \langle \neg p_1^{\{2,3,5,6\}}, p_2^{\{0,3,7\}}, p_3^{\{1,3,7\}}, \neg p_4^{\{4,5,6,7\}} \rangle \\
1 : \langle \neg p_1^{\{2,3,5,6\}}, \neg p_2^{\{1,2,4,5\}}, p_3^{\{1,3,7\}}, p_4^{\{0,1,3\}} \rangle \\
2 : \langle p_1^{\{0,1,7\}}, \neg p_2^{\{1,2,4,5\}}, p_3^{\{1,3,7\}}, \neg p_4^{\{4,5,6,7\}} \rangle \\
3 : \langle p_1^{\{0,1,7\}}, \neg p_2^{\{1,2,4,5\}}, \neg p_3^{\{0,2,4,6\}}, p_4^{\{0,1,3\}} \rangle \\
4 : \langle \neg p_1^{\{2,3,5,6\}}, p_2^{\{0,3,7\}}, \neg p_3^{\{0,2,4,6\}}, p_4^{\{0,1,3\}} \rangle \\
5 : \langle \neg p_1^{\{2,3,5,6\}}, \neg p_2^{\{1,2,4,5\}}, \neg p_3^{\{0,2,4,6\}}, \neg p_4^{\{4,5,6,7\}} \rangle \\
6 : \langle p_1^{\{0,1,7\}}, p_2^{\{0,3,7\}}, \neg p_3^{\{0,2,4,6\}}, \neg p_4^{\{4,5,6,7\}} \rangle
\end{array}\right)$$

163 : Asym, 4 symbols, 56 literals, symm syms : $(p_2, p_4, p_1, p_3)$

## 8 models 58 theories

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0\}}] & 0 : \langle \neg p_1^{\{0\}} \rangle \end{array}\right)$$

164 : Sym, 1 symbols, 2 literals, pures : $p_1$

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{1\}}, \neg p_2^{\{0\}}] & 0 : \langle p_1^{\{1\}}, \neg p_2^{\{0\}} \rangle \\
1 : [p_1^{\{0\}}, p_2^{\{1\}}] & 1 : \langle \neg p_1^{\{0\}}, p_2^{\{1\}} \rangle
\end{array}\right)$$

165 : Sym, 2 symbols, 8 literals, symm syms : $(p_2, p_1)$

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0,1\}}] & 0 : \langle \neg p_2^{\{0,2\}}, \neg p_3^{\{1,2\}} \rangle \\ 1 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0,2\}}] & 1 : \langle \neg p_1^{\{0,1\}}, \neg p_2^{\{0,2\}} \rangle \\ 2 : [\neg p_2^{\{0,1\}}, \neg p_3^{\{0,2\}}] & 2 : \langle \neg p_1^{\{0,1\}}, \neg p_3^{\{1,2\}} \rangle \end{array}\right)$$

166 : Sym, 3 symbols, 12 literals, pures : $p_1, p_2, p_3$, symm syms : $(p_1, p_2, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1,2\}}, \neg p_4^{\{0\}}] & 0 : \langle \neg p_1^{\{1,2\}}, \neg p_4^{\{0\}} \rangle \\ 1 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{1\}}] & 1 : \langle \neg p_2^{\{0,2\}}, \neg p_3^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2\}}] & 2 : \langle \neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}} \rangle \end{array}\right)$$

167 : Sym, 4 symbols, 12 literals, pures : $p_4, p_2, p_3, p_1$, symm syms : $(p_2, p_1)(p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{1,2\}}, p_3^{\{0\}}] & 0 : \langle \neg p_1^{\{1,2\}}, p_3^{\{0\}} \rangle \\ 1 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{1\}}] & 1 : \langle \neg p_2^{\{0,2\}}, \neg p_3^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2\}}] & 2 : \langle \neg p_1^{\{1,2\}}, \neg p_2^{\{0,2\}} \rangle \end{array}\right)$$

168 : Sym, 3 symbols, 12 literals, pures : $p_2, p_1$, symm syms : $(p_2, p_1)$
Conj Res : 0x1:2
Disj Res : 0x1:2

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{1\}}, p_3^{\{2\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{2\}}, \neg p_3^{\{1\}} \rangle \\ 1 : [\neg p_1^{\{1,2\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{1,2\}}, p_2^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{1,2\}}, \neg p_2^{\{0\}}] & 2 : \langle \neg p_1^{\{1,2\}}, p_3^{\{0\}} \rangle \end{array}\right)$$

169 : Sym, 3 symbols, 14 literals, symm syms : $(p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [p_2^{\{0\}}, \neg p_3^{\{2\}}, \neg p_4^{\{1\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, p_3^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{2\}}, p_3^{\{0\}}, \neg p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_4^{\{0,1\}} \rangle \\ 2 : [\neg p_1^{\{0,1\}}, \neg p_2^{\{2\}}] & 2 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{0,3\}} \rangle \\ 3 : [\neg p_1^{\{0,1\}}, \neg p_3^{\{2\}}] & \end{array}\right)$$

170 : Asym, 4 symbols, 17 literals, pures : $p_4, p_1$, symm syms : $(p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,1\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{0,2\}}] & 0 : \langle \neg p_2^{\{0,3\}}, \neg p_3^{\{0,1\}}, \neg p_4^{\{0,2\}} \rangle \\ 1 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,3\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, \neg p_4^{\{0,2\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,1\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,1\}} \rangle \end{array}\right)$$

171 : Sym, 4 symbols, 18 literals, pures : $p_4, p_3, p_2, p_1$, symm syms : $(p_4, p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,3\}}, \neg p_3^{\{0,2\}}, p_4^{\{1\}}] & 0 : \langle \neg p_2^{\{0,3\}}, \neg p_3^{\{0,1\}}, \neg p_4^{\{2\}} \rangle \\ 1 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,2\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}} \rangle \end{array}\right)$$

172 : Sym, 4 symbols, 18 literals, pures : $p_2, p_3, p_1$, symm syms : $(p_2, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{0,3\}}, p_3^{\{2\}}, p_4^{\{1\}}] & 0 : \langle \neg p_2^{\{0,3\}}, \neg p_3^{\{1\}}, \neg p_4^{\{2\}} \rangle \\ 1 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, p_3^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,3\}} \rangle \end{array}\right)$$

173 : Sym, 4 symbols, 18 literals, pures : $p_2, p_1$, symm syms : $(p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{2\}}, p_3^{\{1\}}, p_4^{\{3\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{3\}}, \neg p_3^{\{1\}}, \neg p_4^{\{2\}} \rangle \\ 1 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{0\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_3^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, p_2^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, p_4^{\{0\}} \rangle \end{array}\right)$$

174 : Sym, 4 symbols, 20 literals, symm syms : $(p_2, p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{1,2\}}, p_4^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{1,2\}}] & 2 : \langle \neg p_2^{\{0,1,3\}}, \neg p_3^{\{1,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{2,3\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{0,1,3\}} \rangle \end{array}\right)$$

175 : Sym, 4 symbols, 20 literals, pures : $p_2, p_1$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_3^{\{2\}}, \neg p_4^{\{1,3\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{2\}} \rangle \\ 1 : [\neg p_2^{\{0,1\}}, p_3^{\{2\}}, \neg p_4^{\{1,3\}}] & 1 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{2\}}, \neg p_4^{\{0,1\}} \rangle \\ 2 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_4^{\{0,1\}} \rangle \end{array}\right)$$

176 : Sym, 4 symbols, 20 literals, pures : $p_4, p_2$, symm syms : $(p_4, p_2)$
Conj Res : 0x3:1
Disj Res : 0x3:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1\}}, p_2^{\{2\}}, p_3^{\{3\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2\}}, \neg p_3^{\{3\}} \rangle \\ 1 : [p_1^{\{0,1\}}, p_2^{\{2\}}, p_4^{\{3\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2\}}, \neg p_4^{\{3\}} \rangle \\ 2 : [\neg p_1^{\{2,3\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{2,3\}}, \neg p_3^{\{0\}}, \neg p_4^{\{1\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \end{array}\right)$$

177 : Sym, 4 symbols, 22 literals, symm syms : $(p_3, p_4)$

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{1,2\}}] & 0 : \langle \neg p_1^{\{0,3\}}, p_2^{\{1,3\}}, p_3^{\{2,3\}} \rangle \\ 1 : [p_1^{\{1,3\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,2\}}] & 1 : \langle p_1^{\{1,2\}}, p_2^{\{1,3\}}, \neg p_3^{\{0,1\}} \rangle \\ 2 : [p_1^{\{1,3\}}, \neg p_2^{\{2,3\}}, p_3^{\{0,3\}}] & 2 : \langle \neg p_1^{\{0,3\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{0,2\}}, p_2^{\{0,1\}}, p_3^{\{0,3\}}] & 3 : \langle p_1^{\{1,2\}}, \neg p_2^{\{0,2\}}, p_3^{\{2,3\}} \rangle \end{array}\right)$$

178 : Sym, 3 symbols, 24 literals, symm syms : $(p_2, p_3, p_1)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{3\}}, p_2^{\{2\}}, p_3^{\{1\}}, \neg p_4^{\{0,4\}}] & 0 : \langle \neg p_1^{\{2,3\}}, \neg p_4^{\{0,1\}} \rangle \\ 1 : [\neg p_2^{\{1,3,4\}}, \neg p_3^{\{2,3,4\}}, \neg p_4^{\{0,4\}}] & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_3^{\{0\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{2,3,4\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{1,3,4\}}] & 3 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}} \rangle \\ & 4 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}}, \neg p_4^{\{0,1\}} \rangle \end{array}\right)$$

179 : Asym, 4 symbols, 25 literals, pures : $p_4$, symm syms : $(p_3, p_2)$
Disj Res : 3x0:4

$$\left(\begin{array}{ll} 0 : [p_1^{\{4\}}, p_2^{\{1\}}, p_3^{\{0\}}, p_4^{\{2,3\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0,1\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0\}}, \neg p_4^{\{1\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{3,4\}}] & 2 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_4^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{2,3,4\}}] & 3 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{2\}}, p_4^{\{0\}} \rangle \\ & 4 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{2\}} \rangle \end{array}\right)$$

180 : Asym, 4 symbols, 25 literals, symm syms : $(p_2, p_1)$
Disj Res : 4x2:3, 0x3:2

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2,3\}}, p_3^{\{1\}}, p_4^{\{0\}} \rangle \\ 0 : [p_2^{\{1,3\}}, \neg p_3^{\{2,4\}}, p_4^{\{0,5\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, p_3^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{4,5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 2 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3,5\}}, \neg p_2^{\{4,5\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3,5\}}, \neg p_3^{\{2,4\}}] & 4 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{0,3\}} \rangle \\ & 5 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,2\}}, p_4^{\{0\}} \rangle \end{array}\right)$$

181 : Asym, 4 symbols, 27 literals, pures : $p_1$, symm syms : $(p_2, p_3)$
Disj Res : 3x4:2, 1x2:3, 1x5:0, 0x4:5, 0x3:1

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,3\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0,3\}}, p_4^{\{1,4\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{0,3\}}, p_4^{\{1,4\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{2,3,4\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,3\}}] & 3 : \langle \neg p_2^{\{0,1,2\}}, p_3^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2\}}, p_3^{\{0,3\}}, p_4^{\{1,4\}}] & 4 : \langle \neg p_2^{\{0,1,2\}}, \neg p_3^{\{0,3\}}, p_4^{\{1,4\}} \rangle \end{array}\right)$$

182 : Sym, 4 symbols, 28 literals, pures : $p_2, p_1$, symm syms : $(p_3, p_4)(p_2, p_1)$

$$\left(\begin{array}{ll} 0 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0,3\}}, \neg p_4^{\{1,3\}}] & 0 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0,4\}}, p_4^{\{1,4\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, p_4^{\{0,4\}}] & 1 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,3\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2\}}, \neg p_2^{\{2,3,4\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1,2\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{1,3\}}] & 3 : \langle \neg p_2^{\{0,1,2\}}, p_3^{\{0,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 4 : [\neg p_1^{\{0,1,2\}}, p_3^{\{0,3\}}, p_4^{\{0,4\}}] & 4 : \langle \neg p_2^{\{0,1,2\}}, \neg p_3^{\{1,3\}}, p_4^{\{1,4\}} \rangle \end{array}\right)$$

183 : Sym, 4 symbols, 28 literals, pures : $p_2, p_1$, symm syms : $(p_4, p_3)(p_2, p_1)$

$$\left(\begin{array}{ll} 0 : [p_2^{\{1\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{0,2\}}] & 0 : \langle \neg p_2^{\{3,4\}}, p_3^{\{1\}}, \neg p_4^{\{0,2\}} \rangle \\ 1 : [\neg p_1^{\{1,2,3\}}, p_3^{\{0\}}, p_4^{\{1,4\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_2^{\{0\}}, p_4^{\{1,4\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{0,2\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{3,4\}}, \neg p_4^{\{0,2\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,2,4\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,2,4\}} \rangle \\ 4 : [\neg p_2^{\{0,2,4\}}, \neg p_3^{\{3,4\}}, p_4^{\{1,4\}}] & 4 : \langle \neg p_2^{\{3,4\}}, \neg p_3^{\{0,2,4\}}, p_4^{\{1,4\}} \rangle \end{array}\right)$$

184 : Sym, 4 symbols, 28 literals, pures : $p_1$
Conj Res : 0x3:2
Disj Res : 0x3:2

$$\left(\begin{array}{ll} 0 : [p_2^{\{2\}}, p_3^{\{0,3\}}, p_4^{\{1,4\}}] & 0 : \langle \neg p_2^{\{2\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,3\}} \rangle \\ 1 : [p_2^{\{2\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,3\}}] & 1 : \langle \neg p_2^{\{2\}}, \neg p_3^{\{1,3\}}, p_4^{\{0,4\}} \rangle \\ 2 : [\neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,3\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,3\}} \rangle \\ 4 : [\neg p_1^{\{2,3,4\}}, p_3^{\{0,3\}}, p_4^{\{1,4\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, p_4^{\{0,4\}} \rangle \end{array}\right)$$

185 : Sym, 4 symbols, 28 literals, pures : $p_1$, symm syms : $(p_4, p_3)$
Conj Res : 1x2:3, 0x2:4
Disj Res : 2x0:3, 2x1:4

$$\left(\begin{array}{ll} 0 : [p_1^{\{2\}}, p_2^{\{0,1\}}, \neg p_4^{\{3,4\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, p_4^{\{2\}} \rangle \\ 1 : [p_2^{\{0,1\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{3,4\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,2,4\}} \rangle \\ 2 : [\neg p_2^{\{2,3\}}, \neg p_3^{\{1,2,4\}}, p_4^{\{0\}}] & 2 : \langle p_1^{\{0\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{1,2,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1,4\}}, \neg p_2^{\{2,3\}}] & 3 : \langle \neg p_2^{\{2,3\}}, \neg p_4^{\{0,1,4\}} \rangle \\ 4 : [\neg p_1^{\{0,1,4\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{3,4\}}] & 4 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{1,2,4\}}, \neg p_4^{\{0,1,4\}} \rangle \end{array}\right)$$

186 : Sym, 4 symbols, 28 literals, pures : $p_3$
Conj Res : 1x3:4, 0x4:1
Disj Res : 1x3:4, 0x4:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{2\}}, p_2^{\{0,1\}}, \neg p_3^{\{3,4\}}] & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, p_3^{\{2\}} \rangle \\ 1 : [p_2^{\{0,1\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{2\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, p_4^{\{2\}} \rangle \\ 2 : [\neg p_2^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1,4\}}] & 2 : \langle p_1^{\{0\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{1,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1,4\}}, \neg p_2^{\{2,3\}}] & 3 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{0,1,4\}} \rangle \\ 4 : [\neg p_1^{\{0,1,4\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{2\}}] & 4 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{0,1,4\}}, p_4^{\{2\}} \rangle \end{array}\right)$$

187 : Sym, 4 symbols, 28 literals
Conj Res : 1x3:4, 0x4:1
Disj Res : 1x3:4, 0x4:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1\}}, p_2^{\{4\}}, \neg p_4^{\{1,2,3\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{4\}}, \neg p_3^{\{1,2,3\}} \rangle \\ 1 : [p_1^{\{0,1\}}, p_2^{\{4\}}, \neg p_3^{\{0,2,3\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{4\}}, \neg p_4^{\{0,2,3\}} \rangle \\ 2 : [\neg p_1^{\{2,4\}}, \neg p_3^{\{0,2,3\}}, \neg p_4^{\{1,2,3\}}] & 2 : \langle \neg p_1^{\{2,4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0,2,3\}} \rangle \\ 3 : [p_2^{\{4\}}, \neg p_3^{\{0,2,3\}}, \neg p_4^{\{1,2,3\}}] & 3 : \langle \neg p_2^{\{4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0,2,3\}} \rangle \\ 4 : [\neg p_1^{\{2,4\}}, \neg p_2^{\{0,1,3\}}] & 4 : \langle \neg p_1^{\{2,4\}}, p_2^{\{0,1,3\}} \rangle \end{array}\right)$$

188 : Sym, 4 symbols, 28 literals, pures : $p_4, p_3$, symm syms : $(p_4, p_3)$
Conj Res : 3x4:2, 1x2:3, 0x2:3
Disj Res : 4x3:2, 1x2:3, 0x2:3

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1\}}, p_2^{\{4\}}, p_4^{\{2,3\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{4\}}, \neg p_4^{\{2,3\}} \rangle \\ 1 : [p_1^{\{0,1\}}, p_2^{\{4\}}, \neg p_3^{\{1,2,3\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{4\}}, \neg p_3^{\{1,2,3\}} \rangle \\ 2 : [\neg p_1^{\{2,4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 2 : \langle \neg p_1^{\{2,4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{0\}} \rangle \\ 3 : [p_2^{\{4\}}, \neg p_3^{\{1,2,3\}}, \neg p_4^{\{0\}}] & 3 : \langle \neg p_2^{\{4\}}, \neg p_3^{\{1,2,3\}}, p_4^{\{0\}} \rangle \\ 4 : [\neg p_1^{\{2,4\}}, \neg p_2^{\{0,1,3\}}] & 4 : \langle \neg p_1^{\{2,4\}}, p_2^{\{0,1,3\}} \rangle \end{array}\right)$$

189 : Sym, 4 symbols, 28 literals, pures : $p_3$
Conj Res : 3x4:2, 1x2:3, 0x3:1
Disj Res : 4x3:2, 3x0:1, 1x2:3

$$\left(\begin{array}{ll} 0 : [p_1^{\{0\}}, p_2^{\{1\}}, \neg p_3^{\{3,4\}}, p_4^{\{2,4\}}] & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{3,4\}}, p_3^{\{1\}}, \neg p_4^{\{2,4\}} \rangle \\ 1 : [\neg p_1^{\{1,2,3\}}, p_3^{\{0\}}, p_4^{\{2,4\}}] & 1 : \langle \neg p_1^{\{1,2,3\}}, p_2^{\{0\}}, \neg p_4^{\{2,4\}} \rangle \\ 2 : [\neg p_1^{\{1,2,3\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{1,2,3\}}, \neg p_2^{\{3,4\}}, p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3\}}, \neg p_2^{\{0,2,4\}}] & 3 : \langle \neg p_1^{\{1,2,3\}}, \neg p_3^{\{0,2,4\}} \rangle \\ 4 : [\neg p_2^{\{0,2,4\}}, \neg p_3^{\{3,4\}}, \neg p_4^{\{0,1\}}] & 4 : \langle \neg p_2^{\{3,4\}}, \neg p_3^{\{0,2,4\}}, p_4^{\{0,1\}} \rangle \end{array}\right)$$

190 : Sym, 4 symbols, 30 literals

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1\}}, p_2^{\{2\}}, p_3^{\{0,3\}}, \neg p_4^{\{0,4\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2\}}, p_3^{\{0,4\}}, \neg p_4^{\{0,3\}} \rangle \\ 1 : [p_1^{\{0,1\}}, p_2^{\{2\}}, \neg p_3^{\{1,4\}}, p_4^{\{1,3\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2\}}, \neg p_3^{\{1,3\}}, p_4^{\{1,4\}} \rangle \\ 2 : [\neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,4\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0,4\}}, p_4^{\{1,4\}} \rangle \\ 4 : [\neg p_1^{\{2,3,4\}}, p_3^{\{0,3\}}, p_4^{\{1,3\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, \neg p_4^{\{0,3\}} \rangle \end{array}\right)$$

191 : Sym, 4 symbols, 32 literals, symm syms : $(p_4, p_3)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{1,5\}}, p_2^{\{3,6\}}, p_3^{\{4,7\}}, p_4^{\{0,2\}}] & 0 : \langle \neg p_2^{\{1\}}, \neg p_3^{\{2\}}, p_4^{\{0\}} \rangle \\ 1 : [\neg p_1^{\{2,3,6,7\}}, \neg p_2^{\{0,1,4,5\}}] & 1 : \langle p_1^{\{0\}}, \neg p_2^{\{1\}}, \neg p_3^{\{2\}} \rangle \\ 2 : [\neg p_3^{\{0,1,2,3\}}, \neg p_4^{\{4,5,6,7\}}] & 2 : \langle \neg p_1^{\{1\}}, \neg p_3^{\{2\}}, p_4^{\{0\}} \rangle \\ & 3 : \langle \neg p_1^{\{1\}}, p_2^{\{0\}}, \neg p_3^{\{2\}} \rangle \\ & 4 : \langle \neg p_2^{\{1\}}, p_3^{\{0\}}, \neg p_4^{\{2\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1\}}, \neg p_4^{\{2\}} \rangle \\ & 6 : \langle \neg p_1^{\{1\}}, p_2^{\{0\}}, \neg p_4^{\{2\}} \rangle \\ & 7 : \langle \neg p_1^{\{1\}}, p_3^{\{0\}}, \neg p_4^{\{2\}} \rangle \end{array}\right)$$

192 : Asym, 4 symbols, 32 literals, symm syms : $(p_4, p_1, p_2, p_3)$
Disj Res : 7x3:6, 6x4:7, 5x7:4, 4x1:5, 3x0:2, 2x6:3, 1x2:0, 0x5:1

$$\left(\begin{array}{ll} 0 : [p_1^{\{5,6\}}, p_2^{\{1,2\}}, p_4^{\{0,3,4\}}] & 0 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{1,3\}}, p_4^{\{0\}} \rangle \\ 1 : [\neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{0,2,4,5\}}, \neg p_4^{\{1,6\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1,3\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{3,4,5,6\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_3^{\{1,3\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{0,2,4,5\}}, \neg p_4^{\{1,6\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,2\}}, p_4^{\{0\}} \rangle \\ & 4 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{1,3\}}, p_4^{\{0\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{1,3\}} \rangle \\ & 6 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_4^{\{1,3\}} \rangle \end{array}\right)$$

193 : Asym, 4 symbols, 32 literals, pures : $p_3$, symm syms : $(p_2, p_1)$
Disj Res : 5x0:4, 5x3:4, 4x6:5, 2x3:0, 2x4:0, 0x1:2

$$\left(\begin{array}{ll} 0 : [p_1^{\{5,6\}}, p_2^{\{1,2\}}, p_3^{\{0,3,4\}}] & 0 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0\}}, p_4^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,6\}}, p_4^{\{0,2\}}] & 1 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_3^{\{1,3\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{3,4,5,6\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, p_4^{\{1\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3\}}, \neg p_3^{\{1,6\}}, \neg p_4^{\{4,5\}}] & 3 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,2\}}, p_3^{\{0\}} \rangle \\ & 4 : \langle \neg p_2^{\{1,2\}}, p_3^{\{0\}}, \neg p_4^{\{3\}} \rangle \\ & 5 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_4^{\{3\}} \rangle \\ & 6 : \langle p_1^{\{0\}}, \neg p_2^{\{1,2\}}, \neg p_3^{\{1,3\}} \rangle \end{array}\right)$$

194 : Asym, 4 symbols, 32 literals, symm syms : $(p_2, p_1)$
Disj Res : 5x3:4, 4x6:5, 2x3:0, 0x1:2, 0x4:3

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{1,2\}}] & 0 : \langle p_1^{\{1,2\}}, \neg p_2^{\{3,4\}}, \neg p_3^{\{0,2\}} \rangle \\ 1 : [p_1^{\{0,1\}}, p_2^{\{3,5\}}, p_3^{\{3,4\}}, \neg p_4^{\{1,2\}}] & 1 : \langle p_1^{\{1,2\}}, \neg p_2^{\{3,4\}}, \neg p_4^{\{0,1\}} \rangle \\ 2 : [p_1^{\{0,1\}}, p_2^{\{3,5\}}, \neg p_3^{\{0,2\}}, p_4^{\{4,5\}}] & 2 : \langle \neg p_2^{\{3,4\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{0,1\}} \rangle \\ 3 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,1,2\}}] & 3 : \langle \neg p_1^{\{0,3\}}, p_2^{\{1,2\}}, p_3^{\{1,4\}} \rangle \\ 4 : [\neg p_2^{\{0,1,2\}}, p_3^{\{3,4\}}, p_4^{\{4,5\}}] & 4 : \langle \neg p_1^{\{0,3\}}, p_3^{\{1,4\}}, p_4^{\{2,4\}} \rangle \\ & 5 : \langle \neg p_1^{\{0,3\}}, p_2^{\{1,2\}}, p_4^{\{2,4\}} \rangle \end{array}\right)$$

195 : Asym, 4 symbols, 34 literals, symm syms : $(p_4, p_3)(p_1, p_2)$

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_4^{\{0\}} \rangle \\ & 1 : \langle \neg p_1^{\{2,3\}}, \neg p_2^{\{1,3\}}, p_3^{\{0\}} \rangle \\ 0 : [p_1^{\{7\}}, p_2^{\{3,5\}}, p_3^{\{1,2\}}, p_4^{\{0,4,6\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_3^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 1 : [\neg p_2^{\{0,1,6,7\}}, \neg p_3^{\{4,5,6,7\}}, \neg p_4^{\{2,3\}}] & 3 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_4^{\{1\}} \rangle \\ 2 : [\neg p_1^{\{0,1,2,3,4,5\}}, \neg p_3^{\{4,5,6,7\}}] & 4 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{1,2\}}, p_4^{\{0\}} \rangle \\ 3 : [\neg p_1^{\{0,1,2,3,4,5\}}, \neg p_2^{\{0,1,6,7\}}] & 5 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0\}}, \neg p_3^{\{1,2\}} \rangle \\ & 6 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}}, p_4^{\{0\}} \rangle \\ & 7 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{1,2\}} \rangle \end{array}\right)$$

196 : Asym, 4 symbols, 35 literals, symm syms : $(p_3, p_2)$
Disj Res : 7x0:6, 7x4:6, 5x0:4, 5x6:4, 4x3:5, 3x1:2, 2x5:3, 1x4:0, 1x6:0, 0x2:1

$$\left(\begin{array}{ll} & 0 : \langle p_1^{\{0\}}, \neg p_2^{\{3,4\}}, \neg p_4^{\{1,2\}} \rangle \\ 0 : [p_1^{\{0,4\}}, p_2^{\{2,6\}}, p_3^{\{1\}}, p_4^{\{2,3,5\}}] & 1 : \langle \neg p_2^{\{3,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,2\}} \rangle \\ 1 : [p_2^{\{2,6\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,1\}}] & 2 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0,1\}}, p_4^{\{0,4\}} \rangle \\ 2 : [\neg p_1^{\{2,5,6\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,1\}}] & 3 : \langle \neg p_2^{\{3,4\}}, \neg p_3^{\{1,2,4\}}, p_4^{\{0,4\}} \rangle \\ 3 : [\neg p_1^{\{2,5,6\}}, \neg p_2^{\{0,1,3,4\}}] & 4 : \langle p_1^{\{0\}}, \neg p_2^{\{3,4\}}, \neg p_3^{\{1,2,4\}} \rangle \\ 4 : [\neg p_2^{\{0,1,3,4\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{2,3,5\}}] & 5 : \langle \neg p_1^{\{2,3\}}, \neg p_3^{\{1,2,4\}}, p_4^{\{0,4\}} \rangle \\ & 6 : \langle \neg p_1^{\{2,3\}}, p_2^{\{0,1\}}, \neg p_3^{\{1,2,4\}} \rangle \end{array}\right)$$

197 : Asym, 4 symbols, 36 literals
Conj Res : 1x3:2
Disj Res : 6x3:5, 4x5:3, 3x0:4, 2x3:5, 1x4:0

$$\left(\begin{array}{ll} 0 : [\neg p_1^{\{0,3,5\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{1,2\}}] & 0 : \langle \neg p_1^{\{0,3,4\}}, p_3^{\{1,5\}}, p_4^{\{1,2\}} \rangle \\ 1 : [p_2^{\{1\}}, p_3^{\{0,2,3\}}, p_4^{\{0,4,5\}}] & 1 : \langle p_2^{\{1\}}, \neg p_3^{\{0,2,3\}}, \neg p_4^{\{0,4,5\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{1,4\}}, p_4^{\{0,4,5\}}] & 2 : \langle \neg p_2^{\{2,3,4,5\}}, p_3^{\{1,5\}}, \neg p_4^{\{0,4,5\}} \rangle \\ 3 : [\neg p_1^{\{0,3,5\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{1,4\}}] & 3 : \langle \neg p_1^{\{0,3,4\}}, \neg p_2^{\{2,3,4,5\}}, p_3^{\{1,5\}} \rangle \\ 4 : [\neg p_1^{\{0,3,5\}}, \neg p_2^{\{2,3,4,5\}}, \neg p_4^{\{1,2\}}] & 4 : \langle \neg p_2^{\{2,3,4,5\}}, \neg p_3^{\{0,2,3\}}, p_4^{\{1,2\}} \rangle \\ 5 : [\neg p_2^{\{2,3,4,5\}}, p_3^{\{0,2,3\}}, \neg p_4^{\{1,2\}}] & 5 : \langle \neg p_1^{\{0,3,4\}}, \neg p_2^{\{2,3,4,5\}}, p_4^{\{1,2\}} \rangle \end{array}\right)$$

198 : Sym, 4 symbols, 36 literals, pures : $p_1$, symm syms : $(p_3, p_4)$
Conj Res : 5x0:4, 5x3:4, 2x0:3, 2x4:3
Disj Res : 5x2:3, 3x4:5, 0x2:3, 0x4:5

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1,2\}}, p_3^{\{3,4\}}, p_4^{\{4,5\}}] & 0 : \langle p_1^{\{0,1,2\}}, \neg p_2^{\{3,4\}}, \neg p_3^{\{4,5\}} \rangle \\ 1 : [p_1^{\{0,1,2\}}, p_2^{\{3,5\}}, p_3^{\{3,4\}}] & 1 : \langle p_1^{\{0,1,2\}}, \neg p_2^{\{3,4\}}, \neg p_4^{\{3,5\}} \rangle \\ 2 : [p_1^{\{0,1,2\}}, p_2^{\{3,5\}}, p_4^{\{4,5\}}] & 2 : \langle p_1^{\{0,1,2\}}, \neg p_3^{\{4,5\}}, \neg p_4^{\{3,5\}} \rangle \\ 3 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,1\}}, \neg p_4^{\{1,2\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_3^{\{0,1\}} \rangle \\ 4 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,1\}}, \neg p_3^{\{0,2\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,1\}}, p_4^{\{0,2\}} \rangle \\ 5 : [\neg p_1^{\{3,4,5\}}, \neg p_3^{\{0,2\}}, \neg p_4^{\{1,2\}}] & 5 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_4^{\{0,2\}} \rangle \end{array}\right)$$

199 : Sym, 4 symbols, 36 literals, symm syms : $(p_4, p_3, p_2)$

$$\left(\begin{array}{ll} 0 : [p_1^{\{0,1,2\}}, p_3^{\{3,4\}}, p_4^{\{0,5\}}] & 0 : \langle p_1^{\{0,1,2\}}, \neg p_2^{\{3,4\}}, p_4^{\{0,5\}} \rangle \\ 1 : [p_1^{\{0,1,2\}}, p_2^{\{4,5\}}, p_3^{\{3,4\}}] & 1 : \langle p_1^{\{0,1,2\}}, \neg p_2^{\{3,4\}}, \neg p_3^{\{4,5\}} \rangle \\ 2 : [p_1^{\{0,1,2\}}, p_2^{\{4,5\}}, \neg p_4^{\{2,3\}}] & 2 : \langle p_1^{\{0,1,2\}}, \neg p_3^{\{4,5\}}, \neg p_4^{\{2,3\}} \rangle \\ 3 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,1\}}, \neg p_4^{\{2,3\}}] & 3 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,3\}} \rangle \\ 4 : [\neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,1\}}, \neg p_3^{\{1,2\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_3^{\{0,1\}} \rangle \\ 5 : [\neg p_1^{\{3,4,5\}}, \neg p_3^{\{1,2\}}, p_4^{\{0,5\}}] & 5 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_4^{\{0,5\}} \rangle \end{array}\right)$$

200 : Sym, 4 symbols, 36 literals, symm syms : $(p_3, p_2)$
Conj Res : 5x3:4, 0x2:1
Disj Res : 5x3:4, 0x2:1

$$\left(\begin{array}{ll} & 0 : \langle \neg p_2^{\{1,2\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,3\}} \rangle \\ & 1 : \langle \neg p_2^{\{1,2\}}, \neg p_3^{\{1,3\}}, p_4^{\{0,4\}} \rangle \\ 0 : [p_2^{\{4,5\}}, p_3^{\{0,6,7\}}, p_4^{\{1,2,3\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,2\}}, p_4^{\{0,4\}} \rangle \\ 1 : [\neg p_2^{\{0,1,2,6\}}, \neg p_3^{\{1,3,5\}}, \neg p_4^{\{0,4,7\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{1,3\}}, p_4^{\{0,4\}} \rangle \\ 2 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_2^{\{0,1,2,6\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_4^{\{1,3\}} \rangle \\ 3 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_3^{\{1,3,5\}}, \neg p_4^{\{0,4,7\}}] & 5 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{0\}}, \neg p_3^{\{1,3\}} \rangle \\ 4 : [\neg p_1^{\{2,3,4,5,6,7\}}, p_3^{\{0,6,7\}}, p_4^{\{1,2,3\}}] & 6 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{1,2\}}, p_3^{\{0,4\}} \rangle \\ & 7 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{0,4\}}, \neg p_4^{\{1,3\}} \rangle \end{array}\right)$$

201 : Asym, 4 symbols, 38 literals, pures : $p_1$, symm syms : $(p_3, p_4)$
Conj Res : 0x2:4
Disj Res : 7x5:4, 6x1:2, 6x3:2, 5x1:3, 5x2:3, 4x0:7, 4x6:7, 3x4:5, 2x0:6, 2x7:6

$$\left(\begin{array}{ll} & 0 : \langle \neg p_1^{\{3,4\}}, \neg p_2^{\{2,3\}}, p_3^{\{1\}}, p_4^{\{0\}} \rangle \\ 0 : [p_1^{\{2,6\}}, p_2^{\{1,4\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_4^{\{1,2,4\}} \rangle \\ 1 : [p_1^{\{2,6\}}, p_2^{\{1,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,2,3,5\}}] & 2 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_4^{\{1,2,4\}} \rangle \\ 2 : [\neg p_2^{\{0,2,5,6\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{1,2,3,5\}}] & 3 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{0,2,4\}}, \neg p_4^{\{1,2,4\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3,4\}}, \neg p_2^{\{0,2,5,6\}}] & 4 : \langle \neg p_1^{\{3,4\}}, p_2^{\{0,1\}}, \neg p_3^{\{0,2,4\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3,4\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{1,2,3,5\}}] & 5 : \langle \neg p_2^{\{2,3\}}, \neg p_3^{\{0,2,4\}}, \neg p_4^{\{1,2,4\}} \rangle \\ & 6 : \langle p_1^{\{0,1\}}, \neg p_2^{\{2,3\}}, \neg p_3^{\{0,2,4\}} \rangle \end{array}\right)$$

202 : Asym, 4 symbols, 38 literals, symm syms : $(p_2, p_1)(p_3, p_4)$
Disj Res : 6x3:5, 4x5:3, 2x3:5, 1x5:3

$$\left(\begin{array}{ll}
 & 0 : \langle \neg p_1^{\{3,4\}}, p_2^{\{2\}}, p_4^{\{0,1\}} \rangle \\
0 : [p_1^{\{4,7\}}, p_3^{\{1,2,3\}}, p_4^{\{0,5,6\}}] & 1 : \langle \neg p_1^{\{3,4\}}, p_2^{\{2\}}, p_3^{\{0,1\}} \rangle \\
1 : [\neg p_2^{\{3,4,6,7\}}, p_3^{\{1,2,3\}}, p_4^{\{0,5,6\}}] & 2 : \langle \neg p_1^{\{3,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,4\}} \rangle \\
2 : [p_2^{\{0,1\}}, \neg p_3^{\{5,6,7\}}, \neg p_4^{\{2,3,4\}}] & 3 : \langle \neg p_2^{\{1,3\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,4\}} \rangle \\
3 : [\neg p_1^{\{0,1,2,5\}}, \neg p_2^{\{3,4,6,7\}}] & 4 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_4^{\{2,4\}} \rangle \\
4 : [\neg p_1^{\{0,1,2,5\}}, \neg p_3^{\{5,6,7\}}, \neg p_4^{\{2,3,4\}}] & 5 : \langle \neg p_1^{\{3,4\}}, \neg p_3^{\{2,4\}}, p_4^{\{0,1\}} \rangle \\
 & 6 : \langle \neg p_2^{\{1,3\}}, \neg p_3^{\{2,4\}}, p_4^{\{0,1\}} \rangle \\
 & 7 : \langle p_1^{\{0\}}, \neg p_2^{\{1,3\}}, \neg p_3^{\{2,4\}} \rangle
\end{array}\right)$$

203 : Asym, 4 symbols, 38 literals, symm syms : $(p_1, p_2)(p_4, p_3)$
Conj Res : 2x3:4, 0x3:1
Disj Res : 7x5:6, 6x4:7, 4x2:3, 3x7:4, 1x3:2, 1x5:0, 0x6:5, 0x2:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{0,1\}}, p_2^{\{3,5\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{1,2\}}] & 0 : \langle p_1^{\{0,1\}}, \neg p_2^{\{3,5\}}, p_3^{\{1,4\}}, p_4^{\{1,2\}} \rangle \\
1 : [p_1^{\{0,1\}}, p_3^{\{0,2,3\}}, p_4^{\{0,4,5\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_3^{\{0,2,3\}}, \neg p_4^{\{0,4,5\}} \rangle \\
2 : [\neg p_1^{\{2,3,4,5\}}, \neg p_3^{\{1,4\}}, p_4^{\{0,4,5\}}] & 2 : \langle \neg p_1^{\{2,3,4,5\}}, p_3^{\{1,4\}}, \neg p_4^{\{0,4,5\}} \rangle \\
3 : [\neg p_1^{\{2,3,4,5\}}, \neg p_2^{\{0\}}, \neg p_3^{\{1,4\}}] & 3 : \langle \neg p_1^{\{2,3,4,5\}}, p_2^{\{0\}}, p_3^{\{1,4\}} \rangle \\
4 : [\neg p_1^{\{2,3,4,5\}}, p_3^{\{0,2,3\}}, \neg p_4^{\{1,2\}}] & 4 : \langle \neg p_1^{\{2,3,4,5\}}, \neg p_3^{\{0,2,3\}}, p_4^{\{1,2\}} \rangle \\
5 : [\neg p_1^{\{2,3,4,5\}}, \neg p_2^{\{0\}}, \neg p_4^{\{1,2\}}] & 5 : \langle \neg p_1^{\{2,3,4,5\}}, p_2^{\{0\}}, p_4^{\{1,2\}} \rangle
\end{array}\right)$$

204 : Sym, 4 symbols, 38 literals, symm syms : $(p_3, p_4)$
Conj Res : 4x3:5, 2x5:3
Disj Res : 5x2:3, 3x4:5

$$\left(\begin{array}{ll}
 & 0 : \langle \neg p_2^{\{0,2\}}, p_3^{\{1,4\}}, \neg p_4^{\{1,3\}} \rangle \\
0 : [\neg p_2^{\{0,1,6,7\}}, \neg p_3^{\{1,4,5\}}, p_4^{\{1,2,3\}}] & 1 : \langle p_1^{\{1\}}, \neg p_2^{\{0,2\}}, \neg p_3^{\{0,3\}}, p_4^{\{0,4\}} \rangle \\
1 : [p_1^{\{1\}}, p_2^{\{3,5\}}, p_3^{\{0,2,6\}}, \neg p_4^{\{0,4,7\}}] & 2 : \langle \neg p_1^{\{2,3,4\}}, p_3^{\{1,4\}}, p_4^{\{0,4\}} \rangle \\
2 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_2^{\{0,1,6,7\}}] & 3 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{1\}}, p_4^{\{0,4\}} \rangle \\
3 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_3^{\{1,4,5\}}, \neg p_4^{\{0,4,7\}}] & 4 : \langle \neg p_1^{\{2,3,4\}}, \neg p_3^{\{0,3\}}, \neg p_4^{\{1,3\}} \rangle \\
4 : [\neg p_1^{\{2,3,4,5,6,7\}}, p_3^{\{0,2,6\}}, p_4^{\{1,2,3\}}] & 5 : \langle \neg p_1^{\{2,3,4\}}, p_2^{\{1\}}, \neg p_3^{\{0,3\}} \rangle \\
 & 6 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,2\}}, p_3^{\{1,4\}} \rangle \\
 & 7 : \langle \neg p_1^{\{2,3,4\}}, \neg p_2^{\{0,2\}}, \neg p_4^{\{1,3\}} \rangle
\end{array}\right)$$

205 : Asym, 4 symbols, 40 literals, symm syms : $(p_3, p_4)$
Disj Res : 6x4:7, 5x7:4, 3x4:5, 3x6:2, 2x0:6, 2x7:6, 2x5:3, 0x4:7

$$\left(\begin{array}{ll}
0 : [p_2^{\{6\}}, p_3^{\{0,2,3\}}, p_4^{\{1,4,5\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{2,3,4\}}, p_3^{\{0,1\}} \rangle \\
1 : [p_1^{\{6\}}, p_3^{\{0,2,3\}}, p_4^{\{1,4,5\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{2,3,4\}}, p_4^{\{0,1\}} \rangle \\
2 : [\neg p_2^{\{0,1,3,5\}}, \neg p_3^{\{4,5,6\}}, \neg p_4^{\{2,3,6\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,4,5\}} \rangle \\
3 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{0,1,3,5\}}, \neg p_3^{\{4,5,6\}}] & 3 : \langle \neg p_2^{\{2,3,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,4,5\}} \rangle \\
4 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{0,1,3,5\}}, \neg p_4^{\{2,3,6\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_3^{\{2,3,5\}}, p_4^{\{0,1\}} \rangle \\
5 : [\neg p_1^{\{0,1,2,4\}}, \neg p_3^{\{4,5,6\}}, \neg p_4^{\{2,3,6\}}] & 5 : \langle \neg p_2^{\{2,3,4\}}, \neg p_3^{\{2,3,5\}}, p_4^{\{0,1\}} \rangle \\
 & 6 : \langle p_1^{\{1\}}, p_2^{\{0\}}, \neg p_3^{\{2,3,5\}}, \neg p_4^{\{2,4,5\}} \rangle
\end{array}\right)$$

206 : Asym, 4 symbols, 40 literals, symm syms : $(p_4, p_3)(p_2, p_1)$
Disj Res : 1x2:0, 1x3:0, 0x4:1, 0x5:1

$$\left(\begin{array}{ll}
0 : [\neg p_2^{\{4,5,6\}}, \neg p_3^{\{2,3,6\}}, p_4^{\{0,1,6\}}] & 0 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, p_4^{\{0,2\}} \rangle \\
1 : [p_1^{\{6\}}, p_2^{\{0,2,3\}}, p_3^{\{1,4,5\}}] & 1 : \langle \neg p_1^{\{3,4,5\}}, p_3^{\{1,2\}}, p_4^{\{0,2\}} \rangle \\
2 : [p_2^{\{0,2,3\}}, p_3^{\{1,4,5\}}, p_4^{\{0,1,6\}}] & 2 : \langle \neg p_1^{\{3,4,5\}}, p_2^{\{1,2\}}, \neg p_3^{\{0,3,5\}} \rangle \\
3 : [\neg p_1^{\{0,1,2,4\}}, \neg p_3^{\{2,3,6\}}, \neg p_4^{\{3,5\}}] & 3 : \langle p_2^{\{1,2\}}, \neg p_3^{\{0,3,5\}}, \neg p_4^{\{3,4\}} \rangle \\
4 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{4,5,6\}}, \neg p_4^{\{3,5\}}] & 4 : \langle \neg p_1^{\{3,4,5\}}, \neg p_2^{\{0,4,5\}}, p_3^{\{1,2\}} \rangle \\
5 : [\neg p_1^{\{0,1,2,4\}}, \neg p_2^{\{4,5,6\}}, \neg p_3^{\{2,3,6\}}] & 5 : \langle \neg p_2^{\{0,4,5\}}, p_3^{\{1,2\}}, \neg p_4^{\{3,4\}} \rangle \\
 & 6 : \langle p_1^{\{1\}}, \neg p_2^{\{0,4,5\}}, \neg p_3^{\{0,3,5\}}, p_4^{\{0,2\}} \rangle
\end{array}\right)$$

207 : Asym, 4 symbols, 40 literals, symm syms : $(p_3, p_2)$
Conj Res : 0x3:5, 0x4:5
Disj Res : 1x5:4, 1x2:0, 0x3:2, 0x4:1

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,1,5\}}, \neg p_2^{\{3,4,5\}}, \neg p_4^{\{2,5\}}] & 0 : \langle \neg p_1^{\{0,1,2\}}, p_2^{\{2,3,4\}}, p_3^{\{2,5\}} \rangle \\
1 : [\neg p_1^{\{0,1,5\}}, \neg p_2^{\{3,4,5\}}, \neg p_3^{\{2,5\}}] & 1 : \langle \neg p_1^{\{0,1,2\}}, p_2^{\{2,3,4\}}, p_4^{\{2,5\}} \rangle \\
2 : [\neg p_1^{\{0,1,5\}}, p_2^{\{0,1,2\}}, p_3^{\{0,4\}}, p_4^{\{1,3\}}] & 2 : \langle p_1^{\{3,4,5\}}, p_2^{\{2,3,4\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle \\
3 : [p_1^{\{2,3,4\}}, p_2^{\{0,1,2\}}, \neg p_4^{\{2,5\}}] & 3 : \langle p_1^{\{3,4,5\}}, \neg p_2^{\{0,1,5\}}, p_4^{\{2,5\}} \rangle \\
4 : [p_1^{\{2,3,4\}}, p_2^{\{0,1,2\}}, \neg p_3^{\{2,5\}}] & 4 : \langle p_1^{\{3,4,5\}}, \neg p_2^{\{0,1,5\}}, p_3^{\{2,5\}} \rangle \\
5 : [p_1^{\{2,3,4\}}, \neg p_2^{\{3,4,5\}}, p_3^{\{0,4\}}, p_4^{\{1,3\}}] & 5 : \langle \neg p_1^{\{0,1,2\}}, \neg p_2^{\{0,1,5\}}, \neg p_3^{\{1,4\}}, \neg p_4^{\{0,3\}} \rangle
\end{array}\right)$$

208 : Sym, 4 symbols, 40 literals, symm syms : $(p_4, p_3)(p_2, p_1)$

$$\left(\begin{array}{ll}
0 : [p_1^{\{1,4,6\}}, p_2^{\{5\}}, p_4^{\{0,2,3\}}] & 0 : \langle \neg p_1^{\{1,4,6\}}, p_3^{\{5\}}, p_4^{\{0,2,3\}} \rangle \\
1 : [\neg p_1^{\{0,2\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{1,5,6\}}] & 1 : \langle p_1^{\{0,2\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_4^{\{1,5,6\}} \rangle \\
2 : [p_1^{\{1,4,6\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,2,3\}}] & 2 : \langle \neg p_1^{\{1,4,6\}}, \neg p_2^{\{3,4,5,6\}}, p_4^{\{0,2,3\}} \rangle \\
3 : [\neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,2,3\}}] & 3 : \langle \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,2,3,4\}}, p_4^{\{0,2,3\}} \rangle \\
4 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}] & 4 : \langle p_1^{\{0,2\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,2,3,4\}} \rangle \\
5 : [\neg p_2^{\{1,2,3,4\}}, p_3^{\{0\}}, \neg p_4^{\{1,5,6\}}] & 5 : \langle p_2^{\{0\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{1,5,6\}} \rangle \\
6 : [\neg p_1^{\{0,2\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_4^{\{1,5,6\}}] & 6 : \langle p_1^{\{0,2\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{1,5,6\}} \rangle
\end{array}\right)$$

209 : Sym, 4 symbols, 42 literals
Conj Res : 5x1:6, 5x4:6, 3x1:4, 3x6:4, 2x4:3, 0x3:2
Disj Res : 5x1:6, 5x4:6, 4x2:3, 3x1:4, 3x6:4, 0x3:2

$$\left(\begin{array}{ll}
0 : [p_1^{\{2,5,6\}}, p_2^{\{0\}}, p_3^{\{1,3,4\}}] & 0 : \langle \neg p_1^{\{2,5,6\}}, p_2^{\{0\}}, p_4^{\{1,3,4\}} \rangle \\
1 : [p_1^{\{2,5,6\}}, p_3^{\{1,3,4\}}, p_4^{\{0,1\}}] & 1 : \langle \neg p_1^{\{2,5,6\}}, p_3^{\{0,1\}}, p_4^{\{1,3,4\}} \rangle \\
2 : [\neg p_1^{\{0,1,3\}}, \neg p_3^{\{2,6\}}, \neg p_4^{\{2,4,5\}}] & 2 : \langle p_1^{\{0,1,4\}}, \neg p_3^{\{2,3,5\}}, \neg p_4^{\{2,6\}} \rangle \\
3 : [\neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{2,6\}}, p_4^{\{0,1\}}] & 3 : \langle \neg p_1^{\{2,5,6\}}, \neg p_2^{\{3,4,5,6\}}, p_3^{\{0,1\}} \rangle \\
4 : [p_1^{\{2,5,6\}}, \neg p_2^{\{3,4,5,6\}}, p_4^{\{0,1\}}] & 4 : \langle \neg p_2^{\{3,4,5,6\}}, p_3^{\{0,1\}}, \neg p_4^{\{2,6\}} \rangle \\
5 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{2,6\}}] & 5 : \langle p_1^{\{0,1,4\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_4^{\{2,6\}} \rangle \\
6 : [\neg p_1^{\{0,1,3\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_4^{\{2,4,5\}}] & 6 : \langle p_1^{\{0,1,4\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{2,3,5\}} \rangle
\end{array}\right)$$

210 : Sym, 4 symbols, 42 literals
Conj Res : 4x5:3, 3x2:5, 3x6:5, 1x3:4, 0x4:1
Disj Res : 5x3:4, 4x2:5, 4x6:5, 1x4:3, 0x3:1

$$\left(\begin{array}{ll}
0:[\neg p_1^{\{0,2,3,5\}}, p_2^{\{0,6\}}, p_3^{\{0,4\}}, p_4^{\{0,1\}}] & 0:\langle \neg p_1^{\{0,2,4,5\}}, p_2^{\{0,1\}}, p_3^{\{0,3\}}, p_4^{\{0,6\}}\rangle \\
1:[p_2^{\{0,6\}}, \neg p_3^{\{1,2,5,6\}}, \neg p_4^{\{3,4,5,6\}}] & 1:\langle \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,2,5,6\}}, p_4^{\{0,6\}}\rangle \\
2:[\neg p_1^{\{0,2,3,5\}}, \neg p_3^{\{1,2,5,6\}}, \neg p_4^{\{3,4,5,6\}}] & 2:\langle \neg p_1^{\{0,2,4,5\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,2,5,6\}}\rangle \\
3:[\neg p_2^{\{1,2,3,4\}}, p_3^{\{0,4\}}, \neg p_4^{\{3,4,5,6\}}] & 3:\langle \neg p_1^{\{0,2,4,5\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_4^{\{1,2,3,4\}}\rangle \\
4:[\neg p_1^{\{0,2,3,5\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_4^{\{3,4,5,6\}}] & 4:\langle \neg p_2^{\{3,4,5,6\}}, p_3^{\{0,3\}}, \neg p_4^{\{1,2,3,4\}}\rangle \\
5:[\neg p_1^{\{0,2,3,5\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{1,2,5,6\}}] & 5:\langle \neg p_1^{\{0,2,4,5\}}, \neg p_3^{\{1,2,5,6\}}, \neg p_4^{\{1,2,3,4\}}\rangle \\
6:[\neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{1,2,5,6\}}, p_4^{\{0,1\}}] & 6:\langle p_2^{\{0,1\}}, \neg p_3^{\{1,2,5,6\}}, \neg p_4^{\{1,2,3,4\}}\rangle
\end{array}\right)$$

211 : Sym, 4 symbols, 44 literals, pures : $p_1$, symm syms : $(p_3, p_4, p_2)$
Conj Res : 6x2:5, 6x4:5, 3x2:4, 3x5:4, 1x4:2, 1x5:2
Disj Res : 6x2:5, 6x3:5, 4x2:3, 4x5:3, 1x3:2, 1x5:2

$$\left(\begin{array}{ll}
0:[\neg p_2^{\{1,2,5,6\}}, p_3^{\{0,2\}}, \neg p_4^{\{2,3,4\}}] & 0:\langle \neg p_1^{\{1,2,5,6\}}, p_3^{\{0,2\}}, p_4^{\{2,3,4\}}\rangle \\
1:[\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{1,2,5,6\}}, \neg p_4^{\{2,3,4\}}] & 1:\langle \neg p_1^{\{1,2,5,6\}}, \neg p_2^{\{0,1,3,5\}}, p_4^{\{2,3,4\}}\rangle \\
2:[\neg p_1^{\{0,1,3,5\}}, p_2^{\{4\}}, p_3^{\{0,2\}}, p_4^{\{0,1,6\}}] & 2:\langle p_1^{\{4\}}, \neg p_2^{\{0,1,3,5\}}, p_3^{\{0,2\}}, \neg p_4^{\{0,1,6\}}\rangle \\
3:[\neg p_2^{\{1,2,5,6\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,1,6\}}] & 3:\langle \neg p_1^{\{1,2,5,6\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,1,6\}}\rangle \\
4:[p_1^{\{2\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,1,6\}}] & 4:\langle p_2^{\{2\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,1,6\}}\rangle \\
5:[\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{1,2,5,6\}}, \neg p_3^{\{3,4,5,6\}}] & 5:\langle \neg p_1^{\{1,2,5,6\}}, \neg p_2^{\{0,1,3,5\}}, \neg p_3^{\{3,4,5,6\}}\rangle \\
6:[\neg p_1^{\{0,1,3,5\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{2,3,4\}}] & 6:\langle \neg p_2^{\{0,1,3,5\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{2,3,4\}}\rangle
\end{array}\right)$$

212 : Sym, 4 symbols, 44 literals
Conj Res : 4x5:3, 3x1:5, 3x6:5, 0x5:1, 0x6:1
Disj Res : 6x3:5, 4x5:3, 1x3:5, 0x5:1, 0x6:1

$$\left(\begin{array}{ll}
0:[p_1^{\{2,4,6\}}, p_2^{\{0,5\}}, p_3^{\{0,1\}}, p_4^{\{0,3\}}] & 0:\langle \neg p_1^{\{2,4,6\}}, p_2^{\{0,1\}}, p_3^{\{0,5\}}, p_4^{\{0,3\}}\rangle \\
1:[p_2^{\{0,5\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{1,2,5,6\}}] & 1:\langle \neg p_2^{\{3,4,5,6\}}, p_3^{\{0,5\}}, \neg p_4^{\{1,2,5,6\}}\rangle \\
2:[\neg p_1^{\{0\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{1,2,5,6\}}] & 2:\langle p_1^{\{0\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_4^{\{1,2,5,6\}}\rangle \\
3:[\neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,3\}}] & 3:\langle \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,2,3,4\}}, p_4^{\{0,3\}}\rangle \\
4:[\neg p_1^{\{0\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}] & 4:\langle p_1^{\{0\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{1,2,3,4\}}\rangle \\
5:[\neg p_2^{\{1,2,3,4\}}, p_3^{\{0,1\}}, \neg p_4^{\{1,2,5,6\}}] & 5:\langle p_2^{\{0,1\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{1,2,5,6\}}\rangle \\
6:[\neg p_1^{\{0\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_4^{\{1,2,5,6\}}] & 6:\langle p_1^{\{0\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{1,2,5,6\}}\rangle
\end{array}\right)$$

213 : Sym, 4 symbols, 44 literals, symm syms : $(p_3, p_2, p_4)$
Conj Res : 5x2:6, 5x4:6, 3x2:4, 3x6:4, 1x4:2, 1x6:2
Disj Res : 5x2:6, 5x4:6, 3x2:4, 3x6:4, 1x4:2, 1x6:2

$$\left(\begin{array}{ll}
0:[p_1^{\{0,6\}}, \neg p_2^{\{0,3,5\}}, p_3^{\{0,2\}}, p_4^{\{0,1,4\}}] & 0:\langle p_1^{\{0,2\}}, \neg p_2^{\{0,3,5\}}, p_3^{\{0,6\}}, p_4^{\{0,1,4\}}\rangle \\
1:[p_2^{\{1,2\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,1,4\}}] & 1:\langle \neg p_1^{\{3,4,5,6\}}, p_2^{\{1,2\}}, p_4^{\{0,1,4\}}\rangle \\
2:[p_1^{\{0,6\}}, p_2^{\{1,2\}}, \neg p_3^{\{3,4,5,6\}}] & 2:\langle \neg p_1^{\{3,4,5,6\}}, p_2^{\{1,2\}}, p_3^{\{0,6\}}\rangle \\
3:[\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,3,5\}}, \neg p_3^{\{3,4,5,6\}}] & 3:\langle \neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{0,3,5\}}, \neg p_3^{\{1,2,3,4\}}\rangle \\
4:[\neg p_1^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{0,1,4\}}] & 4:\langle \neg p_1^{\{3,4,5,6\}}, \neg p_3^{\{1,2,3,4\}}, p_4^{\{0,1,4\}}\rangle \\
5:[\neg p_1^{\{1,2,3,4\}}, \neg p_2^{\{0,3,5\}}, \neg p_4^{\{5,6\}}] & 5:\langle \neg p_2^{\{0,3,5\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{5,6\}}\rangle \\
6:[\neg p_1^{\{1,2,3,4\}}, p_3^{\{0,2\}}, \neg p_4^{\{5,6\}}] & 6:\langle p_1^{\{0,2\}}, \neg p_3^{\{1,2,3,4\}}, \neg p_4^{\{5,6\}}\rangle
\end{array}\right)$$

214 : Sym, 4 symbols, 44 literals, symm syms : $(p_4, p_2)(p_3, p_1)$
Conj Res : 6x3:5, 4x5:3, 2x4:1, 1x3:4
Disj Res : 6x3:5, 4x5:3, 2x4:1, 1x3:4

$$\begin{pmatrix} 0 : [p_1^{\{0,6\}}, p_2^{\{0,1\}}, p_3^{\{2,4,5\}}, \neg p_4^{\{0,3,4\}}] & 0 : \langle p_1^{\{0,1\}}, p_2^{\{0,6\}}, \neg p_3^{\{2,4,5\}}, \neg p_4^{\{0,3,4\}} \rangle \\ 1 : [p_1^{\{0,6\}}, \neg p_2^{\{3,4,5,6\}}, p_4^{\{1,2,6\}}] & 1 : \langle \neg p_1^{\{3,4,5,6\}}, p_2^{\{0,6\}}, p_4^{\{1,2,6\}} \rangle \\ 2 : [\neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{0,6\}}, p_4^{\{1,2,6\}}] & 2 : \langle \neg p_1^{\{3,4,5,6\}}, p_3^{\{0,6\}}, p_4^{\{1,2,6\}} \rangle \\ 3 : [\neg p_1^{\{1,2,3,5\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_4^{\{0,3,4\}}] & 3 : \langle \neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{1,2,3,5\}}, \neg p_4^{\{0,3,4\}} \rangle \\ 4 : [\neg p_1^{\{1,2,3,5\}}, \neg p_3^{\{0,6\}}, \neg p_4^{\{0,3,4\}}] & 4 : \langle \neg p_2^{\{1,2,3,5\}}, p_3^{\{0,6\}}, \neg p_4^{\{0,3,4\}} \rangle \\ 5 : [\neg p_1^{\{1,2,3,5\}}, \neg p_2^{\{3,4,5,6\}}, \neg p_3^{\{0,6\}}] & 5 : \langle \neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{1,2,3,5\}}, p_3^{\{0,6\}} \rangle \\ 6 : [\neg p_1^{\{1,2,3,5\}}, p_2^{\{0,1\}}, p_3^{\{2,4,5\}}, p_4^{\{1,2,6\}}] & 6 : \langle p_1^{\{0,1\}}, \neg p_2^{\{1,2,3,5\}}, \neg p_3^{\{2,4,5\}}, p_4^{\{1,2,6\}} \rangle \end{pmatrix}$$

215 : Sym, 4 symbols, 46 literals
Conj Res : 2x3:5, 2x4:5, 1x5:2
Disj Res : 2x3:5, 2x4:5, 1x5:2

$$\begin{pmatrix} 0 : [p_1^{\{2,6\}}, p_2^{\{0,6\}}, \neg p_3^{\{3,4,5,6\}}, p_4^{\{1,4,5\}}] & 0 : \langle \neg p_1^{\{3,4,5,6\}}, p_2^{\{0,6\}}, p_3^{\{2,6\}}, \neg p_4^{\{1,4,5\}} \rangle \\ 1 : [\neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,2,6\}}] & 1 : \langle \neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{1,2,3,4\}}, p_4^{\{0,2,6\}} \rangle \\ 2 : [p_1^{\{2,6\}}, \neg p_2^{\{1,2,3,4\}}, p_3^{\{0,2\}}, p_4^{\{1,4,5\}}] & 2 : \langle p_1^{\{0,2\}}, \neg p_2^{\{1,2,3,4\}}, p_3^{\{2,6\}}, \neg p_4^{\{1,4,5\}} \rangle \\ 3 : [\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{3,4,5,6\}}] & 3 : \langle \neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{0,1,3,5\}} \rangle \\ 4 : [\neg p_1^{\{0,1,3,5\}}, \neg p_2^{\{1,2,3,4\}}, \neg p_4^{\{0,2,6\}}] & 4 : \langle \neg p_2^{\{1,2,3,4\}}, \neg p_3^{\{0,1,3,5\}}, p_4^{\{0,2,6\}} \rangle \\ 5 : [\neg p_1^{\{0,1,3,5\}}, \neg p_3^{\{3,4,5,6\}}, \neg p_4^{\{0,2,6\}}] & 5 : \langle \neg p_1^{\{3,4,5,6\}}, \neg p_3^{\{0,1,3,5\}}, p_4^{\{0,2,6\}} \rangle \\ 6 : [\neg p_1^{\{0,1,3,5\}}, p_2^{\{0,6\}}, p_3^{\{0,2\}}, p_4^{\{1,4,5\}}] & 6 : \langle p_1^{\{0,2\}}, p_2^{\{0,6\}}, \neg p_3^{\{0,1,3,5\}}, \neg p_4^{\{1,4,5\}} \rangle \end{pmatrix}$$

216 : Sym, 4 symbols, 48 literals, symm syms : $(p_2, p_1, p_3)$

$$\begin{pmatrix} 0 : [\neg p_1^{\{1,6,7\}}, \neg p_3^{\{0,4,5\}}, \neg p_4^{\{0,2,3\}}] & 0 : \langle p_1^{\{1,6,7\}}, \neg p_3^{\{0,4,5\}}, \neg p_4^{\{0,2,3\}} \rangle \\ 1 : [p_1^{\{0,3,5\}}, p_3^{\{1,2,6\}}, p_4^{\{1,4,7\}}] & 1 : \langle \neg p_1^{\{0,3,4\}}, p_3^{\{1,2,6\}}, p_4^{\{1,5,7\}} \rangle \\ 2 : [\neg p_2^{\{2,3,4,5,6,7\}}, p_3^{\{1,2,6\}}, \neg p_4^{\{0,2,3\}}] & 2 : \langle \neg p_2^{\{2,3,4,5,6,7\}}, p_3^{\{1,2,6\}}, \neg p_4^{\{0,2,3\}} \rangle \\ 3 : [\neg p_1^{\{1,6,7\}}, \neg p_2^{\{2,3,4,5,6,7\}}, \neg p_4^{\{0,2,3\}}] & 3 : \langle p_1^{\{1,6,7\}}, \neg p_2^{\{2,3,4,5,6,7\}}, \neg p_4^{\{0,2,3\}} \rangle \\ 4 : [\neg p_1^{\{1,6,7\}}, \neg p_2^{\{2,3,4,5,6,7\}}, \neg p_3^{\{0,4,5\}}] & 4 : \langle \neg p_2^{\{2,3,4,5,6,7\}}, \neg p_3^{\{0,4,5\}}, p_4^{\{1,5,7\}} \rangle \\ 5 : [\neg p_2^{\{2,3,4,5,6,7\}}, \neg p_3^{\{0,4,5\}}, p_4^{\{1,4,7\}}] & 5 : \langle p_1^{\{1,6,7\}}, \neg p_2^{\{2,3,4,5,6,7\}}, \neg p_3^{\{0,4,5\}} \rangle \\ 6 : [p_1^{\{0,3,5\}}, \neg p_2^{\{2,3,4,5,6,7\}}, p_3^{\{1,2,6\}}] & 6 : \langle \neg p_1^{\{0,3,4\}}, \neg p_2^{\{2,3,4,5,6,7\}}, p_3^{\{1,2,6\}} \rangle \\ 7 : [p_1^{\{0,3,5\}}, \neg p_2^{\{2,3,4,5,6,7\}}, p_4^{\{1,4,7\}}] & 7 : \langle \neg p_1^{\{0,3,4\}}, \neg p_2^{\{2,3,4,5,6,7\}}, p_4^{\{1,5,7\}} \rangle \end{pmatrix}$$

217 : Sym, 4 symbols, 48 literals, pures : $p_2$, symm syms : $(p_3, p_4)$
Conj Res : 7x4:5, 7x2:6, 6x3:2, 6x5:7, 5x0:4, 5x3:4, 2x0:3, 2x4:3, 1x5:7, 1x2:6
Disj Res : 7x2:6, 6x4:7, 5x7:4, 4x0:5, 4x3:5, 3x6:2, 2x0:3, 2x5:3, 1x4:7, 1x2:6

$$\begin{pmatrix} 0 : [p_1^{\{2,3,7\}}, p_3^{\{0,1,4\}}, \neg p_4^{\{5,6,7\}}] & 0 : \langle \neg p_1^{\{5,6,7\}}, p_3^{\{0,1,4\}}, p_4^{\{2,3,7\}} \rangle \\ 1 : [\neg p_2^{\{2,3,4\}}, p_3^{\{0,1,4\}}, \neg p_4^{\{5,6,7\}}] & 1 : \langle \neg p_1^{\{5,6,7\}}, p_2^{\{2,3,4\}}, p_3^{\{0,1,4\}} \rangle \\ 2 : [p_2^{\{1,5,6\}}, \neg p_3^{\{2,6,7\}}, p_4^{\{0,3,4\}}] & 2 : \langle p_1^{\{0,3,4\}}, \neg p_2^{\{1,5,6\}}, \neg p_3^{\{2,6,7\}} \rangle \\ 3 : [p_1^{\{2,3,7\}}, p_2^{\{1,5,6\}}, p_4^{\{0,3,4\}}] & 3 : \langle p_1^{\{0,3,4\}}, \neg p_2^{\{1,5,6\}}, p_4^{\{2,3,7\}} \rangle \\ 4 : [p_1^{\{2,3,7\}}, p_2^{\{1,5,6\}}, p_3^{\{0,1,4\}}] & 4 : \langle \neg p_2^{\{1,5,6\}}, p_3^{\{0,1,4\}}, p_4^{\{2,3,7\}} \rangle \\ 5 : [\neg p_1^{\{0,1,5\}}, \neg p_2^{\{2,3,4\}}, \neg p_4^{\{5,6,7\}}] & 5 : \langle \neg p_1^{\{5,6,7\}}, p_2^{\{2,3,4\}}, \neg p_4^{\{0,1,5\}} \rangle \\ 6 : [\neg p_1^{\{0,1,5\}}, \neg p_2^{\{2,3,4\}}, \neg p_3^{\{2,6,7\}}] & 6 : \langle p_2^{\{2,3,4\}}, \neg p_3^{\{2,6,7\}}, \neg p_4^{\{0,1,5\}} \rangle \\ 7 : [\neg p_1^{\{0,1,5\}}, \neg p_3^{\{2,6,7\}}, p_4^{\{0,3,4\}}] & 7 : \langle p_1^{\{0,3,4\}}, \neg p_3^{\{2,6,7\}}, \neg p_4^{\{0,1,5\}} \rangle \end{pmatrix}$$

218 : Sym, 4 symbols, 48 literals, symm syms : $(p_1, p_3, p_4, p_2)$
Conj Res : 7x5:6, 4x1:0, 4x2:3, 3x0:4, 3x7:2, 2x6:7, 1x6:5, 0x5:1
Disj Res : 7x5:6, 6x2:7, 4x2:3, 3x0:4, 3x7:2, 1x6:5, 1x4:0, 0x5:1

$$\left(\begin{array}{ll}
0 : [p_1^{\{0,1,2\}}, \neg p_2^{\{1,2,6\}}, p_3^{\{1,3,4\}}, p_4^{\{2,3,5\}}] & 0 : \langle p_1^{\{0,1,2\}}, p_2^{\{1,2,6\}}, \neg p_3^{\{2,4,5\}}, \neg p_4^{\{1,3,4\}} \rangle \\
1 : [p_1^{\{0,1,2\}}, p_2^{\{0,4,5\}}, p_3^{\{1,3,4\}}, \neg p_4^{\{0,1,6\}}] & 1 : \langle p_1^{\{0,1,2\}}, \neg p_2^{\{0,3,5\}}, p_3^{\{0,1,6\}}, \neg p_4^{\{1,3,4\}} \rangle \\
2 : [p_1^{\{0,1,2\}}, p_2^{\{0,4,5\}}, \neg p_3^{\{0,2,6\}}, p_4^{\{2,3,5\}}] & 2 : \langle p_1^{\{0,1,2\}}, \neg p_2^{\{0,3,5\}}, \neg p_3^{\{2,4,5\}}, p_4^{\{0,2,6\}} \rangle \\
3 : [\neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{1,2,6\}}, \neg p_4^{\{0,1,6\}}] & 3 : \langle \neg p_1^{\{3,4,5,6\}}, p_3^{\{0,1,6\}}, p_4^{\{0,2,6\}} \rangle \\
4 : [\neg p_1^{\{3,4,5,6\}}, \neg p_3^{\{0,2,6\}}, \neg p_4^{\{0,1,6\}}] & 4 : \langle \neg p_1^{\{3,4,5,6\}}, p_2^{\{1,2,6\}}, p_3^{\{0,1,6\}} \rangle \\
5 : [\neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{1,2,6\}}, \neg p_3^{\{0,2,6\}}] & 5 : \langle \neg p_1^{\{3,4,5,6\}}, p_2^{\{1,2,6\}}, p_4^{\{0,2,6\}} \rangle \\
6 : [\neg p_1^{\{3,4,5,6\}}, p_2^{\{0,4,5\}}, p_3^{\{1,3,4\}}, p_4^{\{2,3,5\}}] & 6 : \langle \neg p_1^{\{3,4,5,6\}}, \neg p_2^{\{0,3,5\}}, \neg p_3^{\{2,4,5\}}, \neg p_4^{\{1,3,4\}} \rangle
\end{array}\right)$$

219 : Sym, 4 symbols, 50 literals, symm syms : $(p_3, p_4, p_2)$

$$\left(\begin{array}{ll}
0 : [p_1^{\{0,1\}}, \neg p_2^{\{1,6,7\}}, p_3^{\{1,2,3\}}, p_4^{\{1,4,5\}}] & 0 : \langle p_1^{\{0,1\}}, p_2^{\{1,4,5\}}, \neg p_3^{\{1,6,7\}}, \neg p_4^{\{1,2,3\}} \rangle \\
1 : [p_1^{\{0,1\}}, p_2^{\{0,2,4\}}, \neg p_3^{\{0,5,7\}}, \neg p_4^{\{0,3,6\}}] & 1 : \langle p_1^{\{0,1\}}, \neg p_2^{\{0,3,6\}}, p_3^{\{0,2,4\}}, p_4^{\{0,5,7\}} \rangle \\
2 : [\neg p_1^{\{2,3,4,5,6,7\}}, p_3^{\{1,2,3\}}, \neg p_4^{\{0,3,6\}}] & 2 : \langle \neg p_1^{\{2,3,4,5,6,7\}}, p_2^{\{1,4,5\}}, p_3^{\{0,2,4\}} \rangle \\
3 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_2^{\{1,6,7\}}, \neg p_4^{\{0,3,6\}}] & 3 : \langle \neg p_1^{\{2,3,4,5,6,7\}}, p_3^{\{0,2,4\}}, \neg p_4^{\{1,2,3\}} \rangle \\
4 : [\neg p_1^{\{2,3,4,5,6,7\}}, p_2^{\{0,2,4\}}, p_3^{\{1,2,3\}}] & 4 : \langle \neg p_1^{\{2,3,4,5,6,7\}}, p_2^{\{1,4,5\}}, p_4^{\{0,5,7\}} \rangle \\
5 : [\neg p_1^{\{2,3,4,5,6,7\}}, p_2^{\{0,2,4\}}, p_4^{\{1,4,5\}}] & 5 : \langle \neg p_1^{\{2,3,4,5,6,7\}}, \neg p_3^{\{1,6,7\}}, p_4^{\{0,5,7\}} \rangle \\
6 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_2^{\{1,6,7\}}, \neg p_3^{\{0,5,7\}}] & 6 : \langle \neg p_1^{\{2,3,4,5,6,7\}}, \neg p_2^{\{0,3,6\}}, \neg p_4^{\{1,2,3\}} \rangle \\
7 : [\neg p_1^{\{2,3,4,5,6,7\}}, \neg p_3^{\{0,5,7\}}, p_4^{\{1,4,5\}}] & 7 : \langle \neg p_1^{\{2,3,4,5,6,7\}}, \neg p_2^{\{0,3,6\}}, \neg p_3^{\{1,6,7\}} \rangle
\end{array}\right)$$

220 : Sym, 4 symbols, 52 literals, symm syms : $(p_4, p_2, p_3)$
Conj Res : 7x3:6, 5x6:7, 5x2:4, 4x3:2, 4x7:5, 2x6:3
Disj Res : 5x6:7, 4x3:2, 4x7:5, 3x7:6, 2x5:4, 2x6:3

$$\left(\begin{array}{ll}
0 : [\neg p_1^{\{0,1,2,3\}}, p_2^{\{0,1,5,6\}}, p_3^{\{0,2,5,7\}}, \neg p_4^{\{1,2,4,5\}}] & 0 : \langle \neg p_1^{\{0,2,5,7\}}, p_2^{\{0,1,5,6\}}, p_3^{\{0,3,6,7\}}, p_4^{\{4,5,6,7\}} \rangle \\
1 : [p_1^{\{4,5,6,7\}}, p_2^{\{0,1,5,6\}}, \neg p_3^{\{1,3,4,6\}}, \neg p_4^{\{1,2,4,5\}}] & 1 : \langle \neg p_1^{\{0,2,5,7\}}, p_2^{\{0,1,5,6\}}, \neg p_3^{\{1,2,4,5\}}, \neg p_4^{\{0,1,2,3\}} \rangle \\
2 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{2,3,4,7\}}, \neg p_3^{\{1,3,4,6\}}, \neg p_4^{\{1,2,4,5\}}] & 2 : \langle \neg p_1^{\{0,2,5,7\}}, \neg p_2^{\{2,3,4,7\}}, p_3^{\{0,3,6,7\}}, \neg p_4^{\{0,1,2,3\}} \rangle \\
3 : [p_1^{\{4,5,6,7\}}, \neg p_2^{\{2,3,4,7\}}, p_3^{\{0,2,5,7\}}, \neg p_4^{\{1,2,4,5\}}] & 3 : \langle \neg p_1^{\{0,2,5,7\}}, \neg p_2^{\{2,3,4,7\}}, \neg p_3^{\{1,2,4,5\}}, p_4^{\{4,5,6,7\}} \rangle \\
4 : [p_1^{\{4,5,6,7\}}, \neg p_2^{\{2,3,4,7\}}, \neg p_3^{\{1,3,4,6\}}, p_4^{\{0,3,6,7\}}] & 4 : \langle p_1^{\{1,3,4,6\}}, \neg p_2^{\{2,3,4,7\}}, \neg p_3^{\{1,2,4,5\}}, \neg p_4^{\{0,1,2,3\}} \rangle \\
5 : [\neg p_1^{\{0,1,2,3\}}, p_2^{\{0,1,5,6\}}, \neg p_3^{\{1,3,4,6\}}, p_4^{\{0,3,6,7\}}] & 5 : \langle p_1^{\{1,3,4,6\}}, p_2^{\{0,1,5,6\}}, p_3^{\{0,3,6,7\}}, \neg p_4^{\{0,1,2,3\}} \rangle \\
6 : [p_1^{\{4,5,6,7\}}, p_2^{\{0,1,5,6\}}, p_3^{\{0,2,5,7\}}, p_4^{\{0,3,6,7\}}] & 6 : \langle p_1^{\{1,3,4,6\}}, p_2^{\{0,1,5,6\}}, \neg p_3^{\{1,2,4,5\}}, p_4^{\{4,5,6,7\}} \rangle \\
7 : [\neg p_1^{\{0,1,2,3\}}, \neg p_2^{\{2,3,4,7\}}, p_3^{\{0,2,5,7\}}, p_4^{\{0,3,6,7\}}] & 7 : \langle p_1^{\{1,3,4,6\}}, \neg p_2^{\{2,3,4,7\}}, p_3^{\{0,3,6,7\}}, p_4^{\{4,5,6,7\}} \rangle
\end{array}\right)$$

221 : Sym, 4 symbols, 64 literals, symm syms : $(p_1, p_2, p_3, p_4)$