

# Result tables from the LTL-NBW-Minimizer

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This document contains detailed experimental results for the NBW minimisation prototype tool using bounded language inclusion checks. In the following tables, the table cells always represent the running time of the prototype tool. Cells with green background represent the result “satisfiable” whereas a red background represents the unsatisfiability result. A Gray background indicates a timeout (t/o) or running out of memory (m/o). The timeout has always been set to 12 hours.

## 1 The tables

### 1.1 Specification Somenzi1

Formula:  $p \cup q$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.2 Specification Somenzi2

Formula:  $p \cup (q \cup r)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.3 Specification Somenzi3

Formula:  $!(p \cup (q \cup r))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## 1.4 Specification Somenzi4

Formula:  $(G F p) \rightarrow (G F r)$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0
4	0.0	0.02	0.03	0.03	0.03	0.03	0.03	0.04

## 1.5 Specification Somenzi5

Formula:  $(F p) \cup (G q)$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0

## 1.6 Specification Somenzi6

Formula:  $(G p) \cup q$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.01	0.01	0.01	0.01	0.01	0.01

## 1.7 Specification Somenzi7

Formula:  $\neg((F F p) \leftrightarrow (F p))$

Size of  $\mathcal{A}^+$ : 1

Size of  $\mathcal{A}^-$ : 1

# states / bound	1	2	3	4	5	6	7	8

## 1.8 Specification Somenzi8

Formula:  $\neg(G F p \rightarrow G F q)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.9 Specification Somenzi9

Formula:  $\neg(G F p \leftrightarrow G F q)$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 6

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.03	0.03	0.02	0.02	0.02	0.02	0.03
4	0.2	1.68	1.69	4.06	1.85	3.39	3.64	3.87

### 1.10 Specification Somenzi10

Formula:  $p \vee (p \parallel q)$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.11 Specification Somenzi11

Formula:  $((X p) U (X q)) \parallel (\neg(X(p U q)))$

Size of  $\mathcal{A}^+$ : 1

Size of  $\mathcal{A}^-$ : 1

# states / bound	1	2	3	4	5	6	7	8

### 1.12 Specification Somenzi12

Formula:  $(X(p) U q) \parallel \neg X(p U (p \&\& q))$

Size of  $\mathcal{A}^+$ : 1

Size of  $\mathcal{A}^-$ : 1

# states / bound	1	2	3	4	5	6	7	8

### 1.13 Specification Somenzi13

Formula:  $(G(p \rightarrow F q)) \&\& ((X(p) U q) \parallel \neg X(p U (p \&\& q)))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.14 Specification Somenzi14

Formula:  $(G (p \rightarrow F q)) \ \&\& \ ((X (p) \cup X(q)) \ || \ ! X (p \cup q))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.15 Specification Somenzi15

Formula:  $(G (p \rightarrow F q))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.16 Specification Somenzi16

Formula:  $! G (p \rightarrow X (q \vee r))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.17 Specification Somenzi17

Formula:  $! (G F p \ || \ F G q)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.18 Specification Somenzi18

Formula:  $G (F p \ \&\& \ F q)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.19 Specification Somenzi19

Formula:  $F \ p \ \&\& \ F \ ! \ p$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0

### 1.20 Specification Somenzi20

Formula:  $(X(q) \ \&\& \ r) \ \vee \ X \ ((s \ \cup \ p) \ \vee \ r) \ \cup \ (s \ \vee \ r)$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.02	0.03	0.05	0.05	0.05	0.06	0.06
4	0.08	0.22	0.75	0.62	0.55	1.1	0.84	0.94

### 1.21 Specification Somenzi21

Formula:  $(G(q \ || \ G \ F \ p) \ \&\& \ G \ ( \ r \ || \ G \ F \ !p)) \ || \ G \ q \ || \ G \ p$

Size of  $\mathcal{A}^+$ : 8

Size of  $\mathcal{A}^-$ : 13

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0
3	0.04	0.06	0.12	0.08	0.08	0.08	0.09	0.09
4	0.27	1.06	2.42	1.58	2.05	1.73	1.82	1.9
5	5.27	29.61	60.46	92.47	99.75	116.85	113.92	53.77
6	603.93	10449.66	18214.66	14136.09	24096.65	19003.34	29608.72	33804.68
7	t/o	31491.05	t/o	t/o	t/o	t/o	t/o	t/o

### 1.22 Specification Somenzi22

Formula:  $(G(q \ || \ F \ G \ p) \ \&\& \ G \ ( \ r \ || \ F \ G \ !p)) \ || \ G \ q \ || \ G \ p$

Size of  $\mathcal{A}^+$ : 8

Size of  $\mathcal{A}^-$ : 11

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.09	0.05	0.05	0.07	0.06	0.07	0.06
4	0.38	0.64	1.33	2.38	1.26	1.43	1.43	1.36
5	4.93	41.86	104.82	78.49	71.47	35.95	112.83	55.89
6	4.18	6666.98	5532.78	2791.4	4189.36	12286.22	3309.59	10718.19
7	7.28	1936.08	t/o	17495.34	t/o	t/o	t/o	t/o

### 1.23 Specification Somenzi23

Formula:  $!((G(q \parallel G F p) \ \&\& \ G ( r \parallel G F !p)) \parallel G q \parallel G p)$

Size of  $\mathcal{A}^+$ : 13

Size of  $\mathcal{A}^-$ : 8

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.14	0.07	0.13	0.2	0.22	0.23	0.23	0.24
4	2.46	4.98	6.54	7.7	5.72	5.62	12.9	7.07
5	215.15	962.63	785.58	1085.06	718.27	2008.57	1168.75	3513.62
6	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
7	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
8	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
9	534.15	t/o	t/o	t/o	t/o	t/o	t/o	t/o
10	996.05	t/o	t/o	t/o	t/o	t/o	t/o	t/o
11	3924.11	t/o	t/o	t/o	t/o	t/o	t/o	t/o
12	4746.06	t/o	t/o	t/o	t/o	t/o	t/o	t/o

### 1.24 Specification Somenzi24

Formula:  $!((G(q \parallel F G p) \ \&\& \ G ( r \parallel F G !p)) \parallel G q \parallel G p)$

Size of  $\mathcal{A}^+$ : 11

Size of  $\mathcal{A}^-$ : 8

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.05	0.07	0.18	0.16	0.13	0.14	0.15	0.16
4	1.23	2.03	5.48	6.81	6.21	6.94	5.96	5.23
5	9.4	181.38	85.53	213.93	478.98	731.45	272.21	300.63
6	42599.75	t/o	t/o	t/o	t/o	t/o	t/o	t/o
7	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
8	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
9	984.62	7073.78	t/o	t/o	t/o	t/o	t/o	t/o
10	1748.88	t/o	t/o	t/o	t/o	t/o	t/o	t/o

### 1.25 Specification Somenzi25

Formula:  $G ( q \ || \ X \ G \ p) \ \&\& \ G ( r \ || \ X \ G \ !p)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.26 Specification Somenzi26

Formula:  $G ( q \ || \ ((X \ p) \ \&\& \ (X \ (!p))))$

Size of  $\mathcal{A}^+$ : 1

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
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### 1.27 Specification Somenzi27

Formula:  $(p \ U \ p) \ || \ (q \ U \ p)$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.28 Specification Etesami1

Formula:  $(p \ U \ (q \ \&\& \ G \ r))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.29 Specification Etesami2

Formula:  $p \ U \ (q \ \&\& \ X \ ( r \ U \ s))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.30 Specification Etenessami3

Formula:  $p \cup (q \wedge \neg X(r \wedge \neg (F(s \wedge \neg X(F(t \wedge \neg X(F(u \wedge \neg X(F(v))))))))))$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 12

# states / bound	1	2	3	4	5	6	7	8
1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2	2.55	0.01	0.01	0.01	0.01	0.01	0.01	0.01
3	7.44	9.29	23.62	13.33	16.68	15.33	16.53	17.4
4	95.09	552.0	702.01	1187.57	1499.99	1106.61	1809.21	1222.95
5	6867.08	t/o	t/o	t/o	t/o	t/o	t/o	t/o
6	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o

### 1.31 Specification Etenessami4

Formula:  $F(p \wedge \neg X G q)$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.32 Specification Etenessami5

Formula:  $F(p \wedge \neg X(q \wedge \neg X F r))$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.03	0.03	0.04	0.06	0.07	0.07	0.07

### 1.33 Specification Etenessami6

Formula:  $F(q \wedge \neg X(p \cup r))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



### 1.34 Specification Etenessami7

Formula:  $(F \ G \ q) \ || \ (F \ G \ p)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.35 Specification Etenessami8

Formula:  $G \ ( \ p \ \rightarrow \ (q \ \cup \ r) )$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.36 Specification Etenessami9

Formula:  $F \ ( \ p \ \&\& \ X \ F \ (q \ \&\& \ X \ F \ (r \ \&\& \ X \ F \ s) ) )$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.1	0.05	0.12	0.19	0.22	0.22	0.24	0.27
4	2.85	1.3	18.23	6.28	7.78	9.84	7.96	35.88

### 1.37 Specification Etenessami10

Formula:  $G \ F \ p \ \&\& \ G \ F \ q \ \&\& \ G \ F \ r \ \&\& \ G \ F \ s \ \&\& \ G \ F \ t$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 6

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.01	0.01	0.01	0.02	0.02	0.02	0.02
3	1.02	2.21	2.68	3.65	4.34	4.36	7.66	5.37
4	67.01	692.42	1804.57	1163.52	2364.13	2142.18	4624.25	5056.23
5	20929.24	t/o	t/o	t/o	t/o	t/o	t/o	t/o

### 1.38 Specification Etenessami11

Formula:  $(p \cup (q \cup r)) \parallel (q \cup (r \cup p)) \parallel (r \cup (p \cup q))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.39 Specification Etenessami12

Formula:  $G ( p \rightarrow (q \cup (G r \parallel G s)))$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 10

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0
3	0.04	0.15	0.17	0.16	0.22	0.23	0.25	0.26

### 1.40 Specification Ehlers1

Formula:  $G F (a \parallel X b)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.41 Specification SpotBench40

Formula:  $[\ ] (!p0)$

Size of  $\mathcal{A}^+$ : 1

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
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### 1.42 Specification SpotBench41

Formula:  $\langle \rangle p1 \rightarrow (!p0 \cup p1)$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.02	0.02	0.03	0.02	0.03	0.03

### 1.43 Specification SpotBench42

Formula:  $\square (p_2 \rightarrow \square (\neg p_0))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.44 Specification SpotBench43

Formula:  $\square ((p_2 \ \& \ \neg p_1 \ \& \ \langle \rangle p_1) \rightarrow (\neg p_0 \ \cup \ p_1))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.45 Specification SpotBench44

Formula:  $\square (p_2 \ \& \ \neg p_1 \rightarrow (\neg p_0 \ \cup \ (p_1 \ \mid \ \square \neg p_0)))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.46 Specification SpotBench45

Formula:  $\langle \rangle (p_0)$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 1

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.47 Specification SpotBench46

Formula:  $\neg p_1 \ \cup \ ((p_0 \ \& \ \neg p_1) \ \mid \ \square \neg p_1)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.48 Specification SpotBench47

Formula:  $\square (\neg p_2) \mid \langle \rangle (p_2 \ \& \ \langle \rangle p_0)$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.01	0.01	0.01
4	0.01	0.02	0.05	0.05	0.08	0.07	0.06	0.09

### 1.49 Specification SpotBench48

Formula:  $\square (p_2 \ \& \ \neg p_1 \rightarrow (\neg p_1 \ \cup \ ((p_0 \ \& \ \neg p_1) \mid \square \neg p_1)))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.50 Specification SpotBench49

Formula:  $\square (p_2 \ \& \ \neg p_1 \rightarrow (\neg p_1 \ \cup \ (p_0 \ \& \ \neg p_1)))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01

### 1.51 Specification SpotBench50

Formula:  $\langle \rangle p_1 \rightarrow (((\neg p_0 \ \& \ \neg p_1) \ \cup \ (p_1 \ \mid \ ((p_0 \ \& \ \neg p_1) \ \cup \ (p_1 \ \mid \ ((\neg p_0 \ \& \ \neg p_1) \ \cup \ (p_1 \ \mid \ ((p_0 \ \& \ \neg p_1) \ \cup \ (p_1 \ \mid \ (\neg p_0 \ \cup \ p_1))))))))))$

Size of  $\mathcal{A}^+$ : 8

Size of  $\mathcal{A}^-$ : 7

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.12	0.15	0.3	0.22	0.26	0.21	0.28	0.22
4	28.28	62.21	72.42	54.59	64.12	56.75	62.38	68.04
5	21401.25	26777.54	42548.96	t/o	t/o	34411.54	t/o	t/o
6	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
7	t/o	1001.29	43028.36	286.95	3474.76	t/o	t/o	627.34

### 1.52 Specification SpotBench51

Formula:  $\square((p_2 \ \& \ \langle\rangle p_1) \rightarrow ((\neg p_0 \ \& \ \neg p_1) \cup (p_1 \mid ((p_0 \ \& \ \neg p_1) \cup (p_1 \mid ((\neg p_0 \ \& \ \neg p_1) \cup (p_1 \mid ((p_0 \ \& \ \neg p_1) \cup (p_1 \mid (\neg p_0 \cup p_1))))))))))$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 8

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.01	0.01	0.01	0.01	0.01	0.01
3	0.17	1.95	1.92	1.71	0.86	0.88	1.03	1.03
4	99.51	138.04	269.7	120.43	195.1	304.86	395.83	592.61
5	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
6	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o

### 1.53 Specification SpotBench52

Formula:  $\square(p_2 \rightarrow ((\neg p_0 \ \& \ \neg p_1) \cup (p_1 \mid ((p_0 \ \& \ \neg p_1) \cup (p_1 \mid ((\neg p_0 \ \& \ \neg p_1) \cup (p_1 \mid (\neg p_0 \cup (p_1 \mid \square \neg p_0)))))))) \mid \square p_0))$

Size of  $\mathcal{A}^+$ : 8

Size of  $\mathcal{A}^-$ : 7

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.05	0.14	0.09	0.12	0.13	0.14	0.15	0.16
4	1.8	5.75	6.79	5.4	5.57	16.71	12.61	13.15
5	645.54	3377.88	2177.26	1901.93	4015.36	2751.78	2092.16	2973.73
6	8.13	21.09	421.71	2361.96	11978.2	1509.06	t/o	3571.56
7	3.94	21.52	182.06	4039.83	3971.26	13984.13	128.58	4638.1

### 1.54 Specification SpotBench53

Formula:  $\square(p_0)$

Size of  $\mathcal{A}^+$ : 1

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8

### 1.55 Specification SpotBench54

Formula:  $\langle\rangle p_1 \rightarrow (p_0 \cup p_1)$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.0	0.01	0.01	0.01	0.01	0.01	0.01

### 1.56 Specification SpotBench55

Formula:  $\square(p2 \rightarrow \square(p0))$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.57 Specification SpotBench56

Formula:  $\square((p2 \ \& \ !p1 \ \& \ \langle \rangle p1) \rightarrow (p0 \cup p1))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.58 Specification SpotBench57

Formula:  $\square(p2 \ \& \ !p1 \rightarrow (p0 \cup (p1 \mid \square p0)))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.59 Specification SpotBench58

Formula:  $\!p0 \cup (p3 \mid \square \!p0)$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0

### 1.60 Specification SpotBench59

Formula:  $\langle \rangle p1 \rightarrow (\!p0 \cup (p3 \mid p1))$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.03	0.03	0.07	0.07	0.1	0.09	0.11

### 1.61 Specification SpotBench60

Formula:  $\Box !p2 \mid \langle \rangle (p2 \ \& \ (!p0 \ \cup \ (p3 \ \mid \ \Box !p0)))$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.03	0.05	0.1	0.1	0.1	0.12	0.11
4	0.51	1.15	2.21	1.33	1.06	2.33	2.74	2.06
5	0.33	1.02	26.98	10.24	56.36	59.4	79.63	80.02

### 1.62 Specification SpotBench61

Formula:  $\Box ((p2 \ \& \ !p1 \ \& \ \langle \rangle p1) \ \rightarrow \ (!p0 \ \cup \ (p3 \ \mid \ p1)))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

### 1.63 Specification SpotBench62

Formula:  $\Box (p2 \ \& \ !p1 \ \rightarrow \ (!p0 \ \cup \ ((p3 \ \mid \ p1) \ \mid \ \Box !p0)))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.01	0.01	0.0	0.01	0.01	0.01	0.01	0.01

### 1.64 Specification SpotBench63

Formula:  $\Box (p0 \ \rightarrow \ \langle \rangle p3)$

Size of  $\mathcal{A}^+$ : 2

Size of  $\mathcal{A}^-$ : 2

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.65 Specification SpotBench64

Formula:  $\langle \rangle p1 \ \rightarrow \ (p0 \ \rightarrow \ (!p1 \ \cup \ (p3 \ \& \ !p1))) \ \cup \ p1$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.02	0.04	0.08	0.06	0.04	0.07	0.07	0.08
4	0.03	0.19	0.36	0.87	0.87	1.28	1.51	1.12

### 1.66 Specification SpotBench65

Formula:  $\square (p2 \rightarrow \square (p0 \rightarrow \langle \rangle p3))$

Size of  $\mathcal{A}^+$ : 3

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### 1.67 Specification SpotBench66

Formula:  $\square ((p2 \ \& \ !p1 \ \& \ \langle \rangle p1) \rightarrow (p0 \rightarrow (!p1 \ U \ (p3 \ \& \ !p1))) \ U \ p1)$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.01	0.02	0.02	0.02	0.03	0.03	0.03
3	0.04	0.28	0.6	0.62	1.31	1.39	0.84	1.39

### 1.68 Specification SpotBench67

Formula:  $\square (p2 \ \& \ !p1 \rightarrow ((p0 \rightarrow (!p1 \ U \ (p3 \ \& \ !p1))) \ U \ (p1 \mid \square (p0 \rightarrow (!p1 \ U \ (p3 \ \& \ !p1))))))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.01	0.01	0.01	0.01	0.01	0.01	0.02
3	0.1	0.16	0.65	0.57	0.62	0.69	0.83	0.86
4	0.34	2.58	10.04	10.7	25.4	10.32	34.86	24.56

### 1.69 Specification SpotBench68

Formula:  $\langle \rangle p0 \rightarrow (!p0 \ U \ (p3 \ \& \ !p0 \ \& \ X(!p0 \ U \ p4)))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 3



# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.03	0.02	0.03	0.04	0.04	0.04	0.04
4	0.02	0.13	0.23	0.33	0.37	0.32	0.4	0.39

### 1.70 Specification SpotBench69

Formula:  $\langle \rangle p1 \rightarrow (!p0 \cup (p1 \mid (p3 \ \& \ !p0 \ \& \ X(!p0 \cup p4))))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.17	0.37	0.25	0.36	0.48	0.5	0.54	0.46
4	0.26	1.2	2.33	2.22	3.85	4.3	6.06	4.91

### 1.71 Specification SpotBench70

Formula:  $([] !p2) \mid (!p2 \cup (p2 \ \& \ \langle \rangle p0 \rightarrow (!p0 \cup (p3 \ \& \ !p0 \ \& \ X(!p0 \cup p4))))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.13	0.3	0.24	0.38	0.48	0.24	0.21	0.27
4	0.23	1.3	2.96	4.77	4.69	6.51	6.95	5.72

### 1.72 Specification SpotBench71

Formula:  $[]((p2 \ \& \ \langle \rangle p1) \rightarrow (!p0 \cup (p1 \mid (p3 \ \& \ !p0 \ \& \ X(!p0 \cup p4))))$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
3	2.58	1.52	4.47	9.71	17.91	14.98	19.84	16.13
4	8.94	60.11	90.1	361.0	246.34	223.37	349.57	667.98
5	62.19	390.68	1416.58	6601.21	12124.34	10551.42	1943.88	3599.51
6	161.94	565.09	2836.15	t/o	t/o	t/o	t/o	t/o

### 1.73 Specification SpotBench72

Formula:  $(\neg(p_2 \rightarrow (\langle p_0 \rightarrow (\neg p_0 \cup (p_1 \mid (p_3 \ \& \ \neg p_0 \ \& \ X(\neg p_0 \cup p_4)))))))$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.05	0.06	0.07	0.07	0.08	0.08	0.09	0.09
3	2.2	2.1	1.46	1.77	3.69	3.12	5.06	3.47
4	4.64	11.1	27.79	75.06	61.14	57.29	212.56	603.2
5	6.72	77.18	247.24	358.0	2230.42	2665.33	904.03	1196.22
6	16.29	233.08	1874.66	7738.46	2891.83	2968.77	6557.02	40884.93

### 1.74 Specification SpotBench73

Formula:  $(\langle (p_3 \ \& \ X\langle p_4 \rangle) \rangle \rightarrow ((\neg p_3) \cup p_0))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.05	0.02	0.05	0.07	0.06	0.09	0.06	0.1
4	0.04	0.8	0.75	2.21	1.76	2.66	3.35	2.86

### 1.75 Specification SpotBench74

Formula:  $\langle p_1 \rightarrow ((\neg(p_3 \ \& \ (\neg p_1) \ \& \ X(\neg p_1 \cup (p_4 \ \& \ \neg p_1)))) \cup (p_1 \mid p_0))$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.29	0.29	0.4	0.48	0.96	1.54	0.79	0.95
4	1.5	23.8	8.85	31.44	28.94	13.1	52.48	24.25
5	6.33	547.79	283.81	1149.59	962.1	2124.64	753.22	3823.42

### 1.76 Specification SpotBench75

Formula:  $(\neg\neg\neg p_2 \mid (((\neg p_2) \cup (p_2 \ \& \ ((\langle p_3 \ \& \ X\langle p_4 \rangle) \rangle \rightarrow ((\neg p_3) \cup p_0))))))$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.41	0.14	0.31	0.43	0.31	0.37	0.35	0.43
4	4.11	12.55	14.19	7.74	22.76	40.11	28.99	19.68
5	3.24	56.62	885.73	149.8	193.85	220.71	787.28	964.24
6	37.26	1251.3	1387.77	7852.66	2308.42	3956.47	3625.92	1401.93

### 1.77 Specification SpotBench76

Formula:  $\square((p2 \ \<p1) \rightarrow ((!(p3 \ \& \ (!p1) \ \& \ X(!p1 \ U \ (p4 \ \& \ !p1)))) \ U \ (p1 \ | \ p0)))$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.02	0.0	0.0	0.01	0.01	0.01	0.01	0.01
3	1.63	3.96	2.07	9.44	6.46	7.77	11.45	10.69
4	14.99	178.27	154.51	130.23	487.42	719.65	823.06	888.59
5	25.6	720.99	2929.06	12836.23	266.69	4993.0	11032.62	25930.33

### 1.78 Specification SpotBench77

Formula:  $\square(p2 \rightarrow (!(p3 \ \& \ (!p1) \ \& \ X(!p1 \ U \ (p4 \ \& \ !p1)))) \ U \ (p1 \ | \ p0) \ | \ \square(!(p3 \ \& \ X\<p4))))$

Size of  $\mathcal{A}^+$ : 8

Size of  $\mathcal{A}^-$ : 10

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.01	0.03	0.02	0.03	0.03	0.03	0.03	0.03
3	2.98	2.75	7.36	10.67	10.85	7.61	10.12	15.71
4	3.52	45.29	78.03	174.5	168.0	516.84	193.7	887.86
5	28.64	275.25	314.03	1145.78	6687.8	1993.47	3053.1	7352.31
6	91.84	268.47	7497.07	12429.12	7806.64	9310.03	t/o	19017.09
7	85.73	2901.21	6784.9	t/o	27850.0	t/o	t/o	t/o

### 1.79 Specification SpotBench78

Formula:  $\square(p3 \ \& \ X\< \ p4 \ \rightarrow \ X(\<(p4 \ \& \ \< \ p0)))$

Size of  $\mathcal{A}^+$ : 9

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.01	0.01	0.01	0.01
3	0.09	0.04	0.16	0.16	0.2	0.3	0.22	0.24
4	0.16	1.48	3.99	3.96	7.14	4.89	6.24	7.0
5	0.49	8.72	47.29	37.65	28.23	103.79	19.08	47.28
6	12.04	11.54	275.28	123.33	132.14	333.87	166.52	347.38
7	86.68	51.24	44.35	10593.01	295.99	1141.56	742.96	239.24
8	4.32	50.51	580.58	1108.6	1276.53	t/o	2028.19	4048.26

## 1.80 Specification SpotBench79

Formula:  $\langle \rangle p1 \rightarrow (p3 \ \& \ X(!p1 \ U \ p4) \rightarrow X(!p1 \ U \ (p4 \ \& \ \langle \rangle p0))) \ U \ p1$

Size of  $\mathcal{A}^+$ : 12

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.02	0.02	0.02	0.03	0.04	0.04	0.03	0.03
3	0.47	0.55	0.46	1.08	1.15	0.73	1.32	0.45
4	10.61	10.65	19.62	25.67	9.55	49.61	50.96	41.41
5	181.49	1654.46	1859.77	2995.0	2102.68	3945.38	2165.28	1794.07
6	136.83	160.67	19403.29	566.24	t/o	2092.22	26527.95	9773.5
7	359.89	448.45	3237.31	1769.75	t/o	t/o	t/o	18805.91
8	8077.15	17333.75	8552.93	t/o	19838.59	t/o	t/o	t/o
9	t/o	9217.7	t/o	t/o	t/o	t/o	t/o	t/o
10	8828.29	t/o	t/o	t/o	t/o	t/o	t/o	t/o
11	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o

## 1.81 Specification SpotBench80

Formula:  $\square (p2 \rightarrow \square (p3 \ \& \ X \langle \rangle p4 \rightarrow X(!p4 \ U \ (p4 \ \& \ \langle \rangle p0))))$

Size of  $\mathcal{A}^+$ : 10

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.02	0.01	0.02	0.03	0.03	0.04	0.04	0.04
3	0.19	0.44	0.41	1.8	1.62	1.08	2.25	1.54
4	4.57	7.56	35.66	46.84	59.4	61.08	95.54	47.07
5	18.85	234.59	431.82	558.89	840.93	2809.62	1526.64	1636.0
6	672.43	571.72	1241.83	862.67	5585.22	t/o	12507.89	3871.58
7	518.79	1715.88	2480.12	30679.69	8491.38	t/o	t/o	t/o
8	21036.94	11706.58	12063.17	t/o	t/o	t/o	t/o	t/o
9	1307.46	t/o	t/o	t/o	t/o	t/o	t/o	t/o

## 1.82 Specification SpotBench81

Formula:  $\square ((p2 \ \& \ \langle p1 \rangle \rightarrow (p3 \ \& \ X(!p1 \ U \ p4) \rightarrow X(!p1 \ U \ (p4 \ \& \ \langle p0 \rangle))) \ U \ p1)$

Size of  $\mathcal{A}^+$ : 17

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.08	0.35	0.47	0.34	0.53	0.42	0.63	0.51
3	3.36	2.76	27.87	30.21	20.48	33.61	34.72	67.51
4	19.28	271.37	624.49	959.31	1149.86	1424.06	1703.86	1994.75
5	397.47	23211.66	23868.85	41791.23	34107.75	37032.21	t/o	t/o
6	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
7	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
8	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
9	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
10	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
11	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
12	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
13	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
14	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
15	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
16	t/o	t/o	t/o	t/o	t/o	t/o	m/o	t/o

## 1.83 Specification SpotBench82

Formula:  $\square (p2 \rightarrow (p3 \ \& \ X(!p1 \ U \ p4) \rightarrow X(!p1 \ U \ (p4 \ \& \ \langle p0 \rangle))) \ U \ (p1 \ | \ \square (p3 \ \& \ X(!p1 \ U \ p4) \rightarrow X(!p1 \ U \ (p4 \ \& \ \langle p0 \rangle))))))$

Size of  $\mathcal{A}^+$ : 28

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.57	0.11	0.13	0.17	0.19	0.22	0.24	0.27
3	4.47	6.78	9.88	30.4	19.75	23.92	44.93	20.8
4	60.1	202.18	410.15	1140.83	949.2	1127.18	1447.36	1535.88
5	1570.42	5041.45	26518.93	28615.44	t/o	42743.95	t/o	t/o
6	13288.13	13726.5	t/o	t/o	t/o	t/o	t/o	t/o
7	40731.75	t/o	t/o	t/o	t/o	t/o	t/o	t/o
8	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
9	t/o	t/o	t/o	t/o	t/o	t/o	t/o	m/o
10	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
11	t/o	t/o	t/o	t/o	t/o	t/o	t/o	m/o
12	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
13	t/o	t/o	t/o	t/o	t/o	m/o	t/o	t/o
14	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
15	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
16	t/o	t/o	t/o	t/o	t/o	t/o	t/o	m/o
17	m/o	t/o	m/o	t/o	t/o	t/o	t/o	t/o
18	t/o	t/o	m/o	m/o	t/o	m/o	t/o	t/o
19	m/o	m/o	m/o	m/o	m/o	t/o	m/o	m/o
20	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
21	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
22	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
23	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
24	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
25	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
26	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o
27	m/o	m/o	m/o	m/o	m/o	m/o	m/o	m/o

### 1.84 Specification SpotBench83

Formula:  $[\ ] (p_0 \rightarrow \langle \rangle (p_3 \ \& \ X \langle \rangle p_4))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.02	0.05	0.14	0.13	0.18	0.19	0.29	0.32
4	0.29	3.35	6.33	10.46	9.12	9.56	10.36	14.2

### 1.85 Specification SpotBench84

Formula:  $\langle \rangle p_1 \rightarrow (p_0 \rightarrow (!p_1 \ U \ (p_3 \ \& \ !p_1 \ \& \ X(!p_1 \ U \ p_4))))$

$\cup p_1$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.01	0.01	0.01	0.01
3	0.26	0.53	0.36	0.51	0.51	0.57	0.53	0.61
4	0.5	1.99	4.42	4.3	4.33	5.28	4.74	5.84
5	3.07	10.62	51.27	79.83	45.9	43.76	107.46	101.68
6	4.09	58.55	148.09	216.68	1575.71	349.27	244.59	236.09

### 1.86 Specification SpotBench85

Formula:  $\square (p2 \rightarrow \square (p0 \rightarrow (p3 \ \& \ X \langle p4)))$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.01	0.01	0.01	0.01	0.01
3	0.04	0.24	0.34	0.44	0.39	0.72	0.51	0.93

### 1.87 Specification SpotBench86

Formula:  $\square ((p2 \ \& \ \langle p1) \rightarrow (p0 \rightarrow (!p1 \ U \ (p3 \ \& \ !p1 \ \& \ X(!p1 \ U \ p4)))) \ U \ p1)$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06
3	1.52	1.57	5.39	6.11	4.87	6.05	3.96	8.75
4	3.48	27.99	42.94	110.47	211.18	176.4	283.47	638.67
5	69.93	91.0	221.36	990.96	2499.13	3167.06	2931.78	4308.36

### 1.88 Specification SpotBench87

Formula:  $\square (p2 \rightarrow (p0 \rightarrow (!p1 \ U \ (p3 \ \& \ !p1 \ \& \ X(!p1 \ U \ p4)))) \ U \ (p1 \ | \ \square (p0 \rightarrow (p3 \ \& \ X \langle p4))))$

Size of  $\mathcal{A}^+$ : 13

Size of  $\mathcal{A}^-$ : 13

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.06
3	0.56	2.66	6.05	3.86	11.06	9.73	8.82	11.74
4	8.55	49.63	101.29	290.42	222.58	793.73	313.77	741.93
5	452.84	1319.7	3918.05	3589.36	5063.2	8422.15	7686.93	18754.04
6	22680.92	t/o	t/o	t/o	t/o	t/o	t/o	t/o
7	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
8	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
9	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
10	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
11	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
12	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o

### 1.89 Specification SpotBench88

Formula:  $\square (p_0 \rightarrow \langle \rangle (p_3 \ \& \ !p_5 \ \& \ X(!p_5 \ U \ p_4)))$

Size of  $\mathcal{A}^+$ : 5

Size of  $\mathcal{A}^-$ : 3

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.08	0.17	0.28	0.23	0.26	0.28	0.3	0.31
4	1.18	6.01	11.27	11.37	20.79	17.0	15.64	19.19

### 1.90 Specification SpotBench89

Formula:  $\langle \rangle p_1 \rightarrow (p_0 \rightarrow (!p_1 \ U \ (p_3 \ \& \ !p_1 \ \& \ !p_5 \ \& \ X(!p_1 \ \& \ !p_5 \ U \ p_4)))) \ U \ p_1$

Size of  $\mathcal{A}^+$ : 7

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.34	1.16	1.06	1.13	1.27	1.13	1.34	1.19
4	4.43	12.5	22.8	34.47	33.75	71.79	49.59	104.42
5	18.81	55.6	174.79	111.4	498.39	405.49	501.24	799.85
6	49.69	215.74	1862.18	4423.48	4911.79	14451.67	5548.57	5866.73

### 1.91 Specification SpotBench90

Formula:  $\square (p_2 \rightarrow \square (p_0 \rightarrow (p_3 \ \& \ !p_5 \ \& \ X(!p_5 \ U \ p_4))))$

Size of  $\mathcal{A}^+$ : 4

Size of  $\mathcal{A}^-$ : 4

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.02	0.01	0.02	0.03	0.03	0.04	0.04	0.05
3	0.1	0.24	0.37	0.68	0.8	0.93	0.78	1.22



## 1.92 Specification SpotBench91

Formula:  $\square ((p2 \ \& \ \langle p1 \rangle \rightarrow (p0 \rightarrow (!p1 \ \cup (p3 \ \& \ !p1 \ \& \ !p5 \ \& \ X(!p1 \ \& \ !p5) \ \cup \ p4)))) \cup \ p1)$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 5

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.27	0.03	0.03	0.03	0.03	0.03	0.04	0.04
3	1.83	4.03	8.85	12.41	11.88	15.9	11.19	11.76
4	40.71	127.3	165.01	440.26	840.2	403.23	909.02	1076.12
5	503.85	591.57	3098.14	12002.35	14329.55	11493.07	11481.21	13452.92

## 1.93 Specification SpotBench92

Formula:  $\square (p2 \rightarrow (p0 \rightarrow (!p1 \ \cup (p3 \ \& \ !p1 \ \& \ !p5 \ \& \ X(!p1 \ \& \ !p5) \ \cup \ p4)))) \cup (p1 \mid \square (p0 \rightarrow (p3 \ \& \ !p5 \ \& \ X(!p5 \ \cup \ p4))))$

Size of  $\mathcal{A}^+$ : 13

Size of  $\mathcal{A}^-$ : 14

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01
2	1.19	0.03	0.04	0.05	0.05	0.06	0.07	0.07
3	0.72	8.36	12.2	15.81	32.4	32.66	34.13	34.54
4	22.4	86.54	106.41	452.75	526.16	544.7	1287.91	708.89
5	720.26	3298.42	4422.94	20088.82	9686.78	33662.09	34518.16	30151.57
6	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
7	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
8	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
9	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
10	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
11	t/o	t/o	t/o	t/o	t/o	t/o	t/o	t/o
12	t/o	t/o	t/o	t/o	t/o	m/o	m/o	m/o

## 1.94 Specification SpotBench93

Formula:  $!p0 \ \cup \ ((p0 \ \cup \ (!p0 \ \cup \ ((p0 \ \cup \ (\square !p0 \ \mid \ \square p0)) \ \mid \ \square !p0)) \ \mid \ \square !p0)) \ \mid \ \square !p0$

Size of  $\mathcal{A}^+$ : 6

Size of  $\mathcal{A}^-$ : 6

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4	0.54	1.2	0.99	1.09	1.14	1.19	1.24	1.28
5	0.05	0.08	2.06	6.81	5.5	5.8	6.18	6.53

## 1.95 Specification SpotBench94

Formula:  $\langle \rangle p_2 \rightarrow (!p_2 \cup (p_2 \& (!p_0 \cup ((p_0 \cup ((!p_0 \cup ((p_0 \cup (\square !p_0 \mid \square p_0)) \mid \square !p_0)) \mid \square !p_0))))))$

Size of  $\mathcal{A}^+$ : 9

Size of  $\mathcal{A}^-$ : 7

# states / bound	1	2	3	4	5	6	7	8
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.03	0.04	0.09	0.05	0.05	0.05	0.05	0.05
4	1.13	2.24	2.04	1.93	2.76	2.82	2.43	3.34
5	1813.56	1794.04	1373.28	1361.82	1336.7	2600.33	2271.65	2638.43
6	0.94	1324.87	882.0	t/o	249.54	t/o	1260.18	2170.81
7	47.04	19411.11	152.55	7829.96	336.45	17.75	2526.82	10940.29
8	9.21	4.84	t/o	t/o	15836.52	1273.97	t/o	17908.43