

Homework 4

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7.4

- c) correct
- d) correct
- e) correct
- f) correct
- g) correct

7.7

- a) 3 models
- b) 15 models
- c) 0 models

7.12

1. to prove $\sim B$
 - negated goal S7: B
 - get S7 from S5 \rightarrow S8: F
 - get S7 from S6 \rightarrow S9: C
 - get S8 from S3 \rightarrow S10: $(\sim C \vee \sim B)$
 - get S9 from S10 \rightarrow S11: $\sim B$
 - get S7 from S11 \rightarrow ()
2. to prove $\sim A$,
 - add the negated goal S7: A
 - get S7 from the first clause of S1, giving S8: $(B \vee E)$
 - get S8 from S4, giving S9: B
 - derive ()

7.17

a)

Given: $(A \vee B) \wedge (\sim A \vee C) \wedge (\sim B \vee D) \wedge (\sim C \vee G) \wedge (\sim D \vee G)$

1. $(A \vee B) \wedge (\sim A \vee C) \wedge (\sim B \vee D) \wedge (\sim C \vee G) \wedge (\sim D \vee G)$
2. $(B \vee C) \wedge (\sim B \vee D) \wedge (\sim C \vee G) \wedge (\sim D \vee G)$
3. $(C \vee D) \wedge (\sim C \vee G) \wedge (\sim D \vee G)$
4. $(D \vee G) \wedge (\sim D \vee G)$
5. $(G \vee G)$
6. G

b) $2n^2 - 2n$

- c) worst-case: propositional resolution will terminate at at least $2n^2 - 2n - 1$ time polynomial in n .
- d) In the worst-case for 3-CNF, all clauses has 3 literals (1 more than 2-CNF worse-case). This makes the termination time (worst-case) scenario different than than that of 2-CNF which means you can't use the same formula for 3-CNF.

7.20

S1: $(\sim A \vee B \vee E) \wedge (\sim B \vee A) \wedge (\sim E \vee A)$

S2: $(\sim E \vee D)$

S3: $(\sim C \vee \sim F \vee \sim B)$

S4: $(\sim E \vee B)$

S5: $(\sim B \vee F)$

S6: $(\sim B \vee C)$