

CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 4
Maximum Points: 27
Due: 10:30 AM, Monday, February 20, 2006

February 13, 2006

Put your answers in a file named `hw4.ext`, for an appropriate value of `ext`. **Include your name at the top of the file.** Submit that file by executing the Unix command

```
submit_cse463 hw4.ext
```

or

```
submit_cse563 hw4.ext
```

whichever is appropriate for you. The file can be a text file, or produced by some word processing software, but it must be formatted so it is easy to read.

Whenever you show a proof, or run `prover` or `SNARK`, include the proof or a transcript of the run in your answer file, and append a clear English statement saying what you conclude from your proof or run, and why.

1. (3) Show the resolution refutation proof that

$$\{\neg A, \neg B\}, \{A, B\}, \{A, C\}, \{B, D\}, \{\neg C, D\}, \{\neg D, E\} \models \{E\}$$

2. (3) Use `prover` to determine whether $(A \Leftrightarrow B \Leftrightarrow C) \models (A \wedge B \wedge C) \vee (\neg A \wedge \neg B \wedge \neg C)$
3. (a) (6) Formalize the following argument in Standard Propositional Logic by giving the syntax and intensional semantics of the atomic propositions.
 - i. If Bob thinks that Larry is a liar, then whenever Larry says something, Bob won't believe him.
 - ii. Whenever there's danger, Larry warns Bob.
 - iii. Larry warns Bob by saying something to him.
 - iv. When there's danger, if Larry warns Bob, then Bob takes evasive action if and only if he believes Larry.
 - v. If there's danger and Bob doesn't take evasive action, he gets injured.
 - vi. Therefore, if Bob thinks that Larry is a liar and there's danger, Bob gets injured.
- (b) (12) Show the translation of each of the previous sentences in your formalization.
- (c) (3) Use `SNARK` to show that the last sentence above is logically implied by the previous ones.