

CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 4
Maximum Points: 15
Due: 11:00 AM, Wednesday, February 20, 2008

February 13, 2007

Write your answers on $8\frac{1}{2} \times 11$ in. paper, with your name at the top. Staple multiple pages once in the upper-left hand corner. Your answers are due at the beginning of lecture on the date given above. Write extremely neatly. Anything unreadable will be considered incorrect.

1. (3) Using the Fitch-style proof theory presented in lecture, prove that

$$\vdash (A \Rightarrow (B \Rightarrow C)) \Rightarrow ((A \wedge B) \Rightarrow C)$$

2. (3) Using the Fitch-style proof theory presented in lecture, prove that

$$\vdash ((A \wedge B) \Rightarrow C) \Rightarrow (A \Rightarrow (B \Rightarrow C))$$

3. (3) Using the Fitch-style proof theory presented in lecture, prove that

$$BD \Leftrightarrow \neg BP, TD \Leftrightarrow \neg TP, BDT \Rightarrow (BD \wedge TP), TDB \Rightarrow (TD \wedge BP), TDB \vee BDT \vdash (TD \Rightarrow BP)$$

4. (3) Using resolution refutation, prove that

$$\{\neg BD, \neg BP\}, \{BP, BD\}, \{\neg TD, \neg TP\}, \{TP, TD\}, \\ \{\neg BDT, BD\}, \{\neg BDT, TP\}, \{\neg TDB, TD\}, \{\neg TDB, BP\}, \{TDB, BDT\} \models \{\neg TD, BP\}$$

5. (3) Translate $(A \vee (B \Leftrightarrow \neg C))$ into a logically equivalent set of clauses. To be eligible for partial credit, show every step.