CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 4
Maximum Points: 12 plus 3 Bonus Points
Due: 11:00 AM, Wednesday, February 18, 2009

February 11, 2009

You must turn in the answers to this homework set as hard-copy 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. Write extremely neatly. Anything unreadable will be considered incorrect.

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

$$BD \Leftrightarrow \neg BP, TD \Leftrightarrow \neg TP, BDT \Rightarrow BD \wedge TP, BDT \vdash \neg BP \wedge \neg TD$$

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

$$\vdash (\neg A \vee \neg B) \Rightarrow \neg(A \wedge B)$$

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

$$\vdash \neg(A \wedge B) \Rightarrow (\neg A \vee \neg B)$$

4. (3) Using resolution refutation, prove that

$$\{bdt\}, \{\neg bd, \neg bp\}, \{\neg td, \neg tp\}, \{tp, td\}, \{\neg bdt, bd\}, \{\neg bdt, tp\}, \models \{\neg bp, \neg td\}$$

5. (3) Translate $((B \vee C) \Leftrightarrow A)$ into a logically equivalent set of clauses. Show every step.