CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 3
Maximum Points: 24
Due: 2:00 PM, Thursday, October 7, 2009

Name(s)⟨user name(s)⟩: _____

September 30, 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(s) and user name(s) 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
$$\vdash A \vee (B \vee C) \Rightarrow B \vee (A \vee C)$$
2. (3) Using the Fitch-style proof theory presented in lecture, prove that
$$(A \Rightarrow B), (C \Rightarrow D) \vdash A \wedge C \Rightarrow B \wedge D$$
3. (3) Using the Fitch-style proof theory presented in lecture, prove that
$$\vdash (A \Rightarrow B) \Rightarrow (\neg B \Rightarrow \neg A)$$
4. (6) Translate $\neg(A \wedge B) \Leftrightarrow \neg C \vee \neg D$ into clause form. Show every step.
5. (3) Using refutation resolution, prove
$$A \vee (B \vee C) \models B \vee (A \vee C)$$
6. (3) Using refutation resolution, prove
$$(A \Rightarrow B), (C \Rightarrow D) \models A \wedge C \Rightarrow B \wedge D$$
7. (3) Using refutation resolution, prove
$$(A \Rightarrow B) \models (\neg B \Rightarrow \neg A)$$