CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 3
Maximum Points: 12
Due: 11:00 AM, Wednesday, February 14, 2007

February 7, 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

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

2. (3) Using the Fitch-style proof theory presented in lecture, prove that $BD, BD \Rightarrow TP, TP \Rightarrow \neg TD \vdash \neg TD$.

3. (3) Using the Fitch-style proof theory presented in lecture, and letting Γ be the domain rules for CarPool World, prove that

$$\Gamma, \mathit{Tom\ drives\ Betty} \vdash \neg \mathit{Tom\ is\ the\ passenger} \wedge \neg \mathit{Betty\ is\ the\ driver}$$

4. (3) We use "proof by cases" for $\vee E$ in our Fitch-style proof theory. An alternative would be to use "disjunctive syllogism." To prove that disjunctive syllogism is valid in our proof theory, prove that $(A \vee B), \neg A \vdash B$ using the Fitch-style proof theory presented in lecture.