CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 10
Maximum Points: 9
Due: 2:00 PM, Thursday, December 9, 2010

Name(s)⟨user name(s)⟩: _____

December 2, 2010

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.

In this homework set, you are to use the Fitch-style proof theory for Relevance Logic presented in lecture, including extended rules. Note that if any of the parents of a normal rule is marked as being the result of an extended rule, then the result of the normal rule is also to be marked as being the result of an extended rule. However, you should not use an extended rule if you can use a normal rule instead.

1. (3) Using the Fitch-style proof theory for Relevance Logic as specified above, prove that

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

2. (3) Using the Fitch-style proof theory for Relevance Logic as specified above, prove that

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

3. (3) Using the Fitch-style proof theory for Relevance Logic as specified above, prove that

$$\exists x P(x) \wedge (\forall x(P(x) \Rightarrow \forall y(P(y) \Rightarrow R(x,y)))) \vdash \exists x(P(x) \wedge \forall y(P(y) \Rightarrow R(x,y)))$$