CSE 4/563 Knowledge Representation
Professor Shapiro
Homework 5
Maximum Points: 20
Due: 2:00 PM, Thursday, October 15, 2009

Name(s)⟨user name(s)⟩: _____

October 8, 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. (6) Using the Fitch-style proof theory presented in lecture, prove that

$$\vdash \forall x P(x) \Rightarrow \neg \exists x \neg P(x)$$

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

$$\vdash \neg \forall x \neg P(x) \Rightarrow \exists x P(x)$$

    (Hint: First assume $\neg \forall x \neg P(x)$, then assume $\neg \exists x P(x)$.)

3. (8) For each of the following pairs of wffs: if they unify, show an mgu; if they fail to unify, say so and give the reason. Assume that: P is a predicate symbol; f is a function symbol; a, b, and c are individual constants; u, v, x, y, and z are variables.

    (a) (2) $P(a, x, b)$ and $P(y, c, z)$

    (b) (2) $P(x, b, f(c))$ and $P(u, v, f(u))$

    (c) (2) $P(a, x, f(b))$ and $P(u, c, f(u))$

    (d) (2) $P(f(x), a, g(f(x)))$ and $P(f(y), u, g(y))$