

Programming Languages (COP 4020/CIS 6930) [Fall 2014]

Assignment V

Objectives

1. To gain experience writing inference rules in deductive systems.
2. To become familiar with definitions of free variables, alpha-equivalence, and capture-avoiding substitution.

Due Date: Tuesday, October 14, 2014 (at the beginning of class, 5:00pm).

Assignment Description

Do the following by yourself.

Consider the following language L:

types $\tau ::= \text{bool} \mid \tau_1 \times \tau_2$

exprs $e ::= x \mid \text{true} \mid \text{false} \mid e_1 \text{ NOR } e_2 \mid (e_1, e_2) \mid \text{let val } (x_1, x_2) = e_1 \text{ in } e_2 \text{ end}$

This language contains variables (x), true and false literals, logical-NOR expressions, binary tuples, and let-expressions. Let-expressions in L have the same meaning as in ML, except that L's let-expressions always declare a pair of variables. For example,

let val (x,y)=(true,false) in let val (x,z)=(y, x NOR y) in x NOR z end end
evaluates to true.

Provide definitions for: (1) free variables, (2) alpha-equivalence, and (3) capture-avoiding substitution in L.

Submission Notes

- Turn in a hardcopy (handwritten or printed) version of your solutions. Please do not email solutions or upload them into Canvas.
- Write the following pledge at the end of your submission: "I pledge my Honor that I have not cheated, and will not cheat, on this assignment." Sign your name after the pledge. Not including this pledge will lower your grade 50%.
- You may submit solutions up to 2 days (48 hours) late with a 15% penalty.
- If you think there's a chance you'll be absent or late for class on the date this assignment is due, you are welcome to submit solutions early by giving them to me or the TA before or after class, or during any of our office hours.