CSE 3302/5307 Programming Language Concepts

Homework 11 - Fall 2025

Due Date: Nov. 3, 2025, 9:00PM Central Time

Name:_____ UTA ID:_____

Problem1 - 20%

Specify the inference rules that could be applied by the unification algorithm in a transition $(S, q) \rightarrow (S', q)$ and number each.

Problem2 - 30%

Use the unification algorithm to solve each of the following sets of constraints. In each step of the solution, mention the inference rule used.

1. $\{X = Int,\ Y = X \to X\ Z = Z\}$
2. $\{Int \to Int = Z \to X\}$
3. $\{Z \to Y = Y \to X,\ X = U \to W\}$
4. $\{Int = Int \to X\}$
5. $\{\}$

Problem3 - 50%

Prove the Lemma: If $(S, q) \to (S', q')$ then:

- T is complete for (S, q) iff T is complete for (S', q')
- T is principal for (S, q) iff T is principal for (S', q')

You can use the following lemma without proof:

Lemma 1. *If* $T(m) = T(n), T| = q$, *then* $T| = q[n/m]$

Lemma 2. *If* $T(a) = T(s), T <= S$, *then* $T <= [a = s] \circ S$