# CSE 3302/5307 Programming Language Concepts

Homework10 - Fall 2023

Due Date: Nov. 4th, 2024, 11:59p.m. Central Time

## 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%

```
c = lambda(l:List Z, z:Z)->List Z...  # library function

fun m(a, g) =
  case a of
    nil => nil
    | h :: t => c(m(t, g), g(h))
```

Generate the polymorphic types for the function $m$ shown. Your solution must clearly distinguish different steps (adding type schemes, generating constraints, solving constraints, etc.). The source of each constraint should be mentioned and unification should be used to solve the constraints.

Name: _____ UTA ID: _____