

17-363/17-663: Programming Language Pragmatics, In-Class Exercises **September 11, 2024**

Andrew ID: _____

1. [Small-Step Operational Semantics] Show the derivation for a single step of execution of the following program: $1 + (x \Rightarrow x + 2)(3)$

2. [Substitution] Show the derivations for the first three single steps of execution for the following program: $\text{let } x = 1 \text{ in } (\text{let } y = (\text{let } x = 3 \text{ in } x) \text{ in } x+y)$