Types & Programming Languages 4
Exercises 5

These exercises are based on the material in Lectures 12 and 13.

We can consider adding *conditional process expressions* to the pi calculus, with syntax

$$\text{if } e \text{ then } P \text{ else } Q$$

where e is an expression of SEL, and P and Q are processes. The intended meaning is that e should be evaluated and then either P or Q should be executed depending on whether the value of e is true or false.

1. Suggest appropriate reduction, structural equivalence, and typing rules for conditional process expressions.

2. Would you expect the following processes to be safe? Should they be typable (with appropriate type annotations)? In each case, either show a typing derivation, or explain why it is not typable.

   (a) inp $a(x)$; if x then out $a(1)$ else out $a(2)$

   (b) inp $a(x, y)$; if x then out $y(x)$ else out $a(x)$