# PPL part 1:

# Question 1:

**Stage I**: Rename bound variables.

((lambda (x1 y1) (if (> x1 y1) #t #f)) 8 3) turn to

 ((lambda (x y) (if (> x y) #t #f)) 8 3)

**Stage II**: Assign type variables for every sub expression:

Expression Variable

((lambda (x y) (if (> x y) #t #f)) 8 3) T0

(lambda (x y) (if (> x y) #t #f)) T1

(if (> x y) #t #f) T2

(> x y) T3

>

x Tx

y Ty

#t

#f

8

3

**Stage III**: Construct type equations. The equations for the sub-expressions are:

Expression Equation

((lambda (x y) (if (> x y) #t #f)) 8 3)

(lambda (x y) (if (> x y) #t #f))

(if (> x y) #t #f)

(> x y)

The equations for the primitives are:

Expression Equation

>

#t

#f

8

3

**Stage IV**: Solve the equations.

Equation Substitution

**Step 1:**

and is a type-sub

Equation Substitution

**Step 2**:

, not type-sub. Because both sides of the equation are composite we split it into three equations and remove equation 2.

Equation Substitution

**Step 3:**

Equation Substitution

**Step 4**:

Equation Substitution

**Step 5**:

Equation Substitution

**Step 6**:

, not a sub-type. We split the equation into three equations.

Equation Substitution

**Step 7:**

Equation Substitution

**Step 8:**

Equation Substitution

**Step 9:**

**Step 10:**

**Step 11:**

**Step 12:**

**Step 13:**

**Step 14:**

**Step 15:**

**Step 16:**

Equation Substitution