Ex1 Item 4

$$[y=bool][x=int](x)=int \quad \text{TVar} \qquad\qquad \text{TConst}$$

$$[y=bool][x=int](y)=bool \quad \text{TVar} \quad [y=bool][x=int](x)=int \quad \text{TVar} \quad [y=bool][x=int]\vdash x :: int \quad [y=bool][x=int]\vdash 1 :: int$$

$$[y=bool][x=int]\vdash y :: bool \quad [y=bool][x=int]\vdash x :: int \quad [y=bool][x=int]\vdash x-1 :: int \qquad \text{TIf}$$

$$[y=bool][x=int]\vdash \text{if } y \text{ then } x \text{ else } x-1 :: int$$

$$\text{TProc}$$

$$[x=int]\vdash proc(y:bool)\{if\ y\ then\ x\ else\ x-1\} :: bool \to int$$

$$\text{TProc}$$

$$\emptyset \vdash Proc(x:int)\{\ Proc(y:bool)\{if\ y\ then\ x\ else\ x-1\}\} :: int \to (bool \to int)$$

Ex1 Item 6

$$[x=int](x)=int \quad \text{TVar} \qquad \text{TConst}$$

$$[x=int]\vdash x :: int \quad [x=int]\vdash 2 :: int \quad \text{TDiff}$$

$$[x=int]\vdash x-2 :: int \quad \text{TZero} \quad \text{TConst} \qquad\qquad \text{TConst}$$

$$[x=int]\vdash zero?(x-2) :: bool \quad [x=int]\vdash 0 :: int \quad [x=int]\vdash 1 :: int \quad \text{TIf} \qquad [two?=(int\to int)](two?)=(int\to int) \quad \text{TVar} \qquad \text{TConst}$$

$$[x=int]\vdash if\ zero?(x-2)\ then\ 0\ else\ 1 :: int \quad \text{TProc} \qquad [two?=(int\to int)]\vdash two? :: int \to int \quad [two?=(int\to int)]\vdash 3 :: int$$

$$\emptyset \vdash Proc(x:int)\{if\ zero?(x-2)\ then\ 0\ else\ 1\} :: int \to int \qquad [two?=(int\to int)]\vdash (two?\ 3) :: int \quad \text{TProcApp}$$

$$\emptyset \vdash let\ two? = proc(x:int)\{if\ zero?(x-2)\ then\ 0\ else\ 1\}\ in\ (two?\ 3) :: int \qquad \text{TLet}$$

Note: "?" is not implemented in lexing, here I just see it as part of the "var"