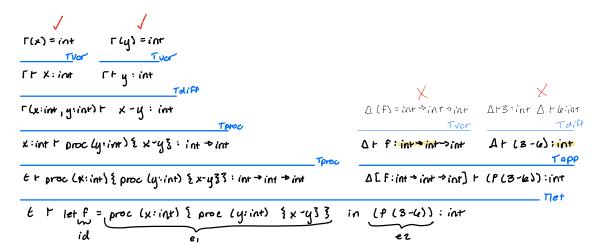
Eric Altenburg and Hamzah Nizami 4117120

I pledge my nonor that I have abided by the Stevens Honor system. - En als



1) let f = proc (x:int) { proc (y:int) {x-y}}
in (f(3-6))

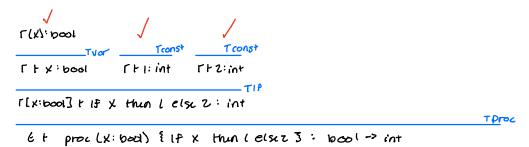


Because of the highlighted section, there is no type environment I and type t that that will allow Arlf (3-4)): + to be derivable. int -> int + int.

2) If zero? (zero? (0)) then I else Z Is not hypoble because but any typeenvironment T with type t, the obore expression is not derived be.

[+ If zero? (zero? (0)) men leix z: t

3) 0 bool -> int , book & it x then I else 23



plane have judgement is derivable. Himefore, his expression

The above type judgement is derivable, therefore, the expression, proclx: bod) { If x then lesses 3 is typoble.

```
@ (bool -> int) -> int: proc (x: bool) { proc (y: int) { if x then y else 4933
```

```
The state of the s
                                r[x:bool, y:inr]t If x then y else 49: int
                                 x: boolt procly: int > 1fx then year 993: int > int
                                                   proc (x: bool) { proc (y: int) { if x then y else 4933 (bool -> int)->int
                          The obove type judgement is derivable, mentifore, hu expression
                           proc (x: bool) ? proc'(y: int) { If x then y else 9933 is typoble.
                 3 bool - (bool -> bod):
                                  proc (a: bool) & if a
                                                                                    then proc (b:bool) lifb then zero? (a) else zero? (1)}
                                                                                    else proc (c:bool) & if c then zero? (1) else zero? (0)33
                                                                                                                                                             Toonst

T(c):bool It 1:int
                                                                                                                                                               _____Tucr_____Teep _____Treo
                                       1(6)=600)
                                                                                                     Tzero Tzero
                                                                                                                                                              THE book It zero? (1): book It zero? (0): book
                                             Atb: bool Atzero? (0): bool Atzero? (1)
                                                                                                                                                          r[c:booi] if c then zero! (1)
                                          A [b: boo] + if b thun zero? (a) else zero? (1): bood
                                                                                                                                                                                            else zero? (o): bool
                                                                                                                                                                                                                                Tproc
                                                           Proc (b: bool)
                                                                                                                                                                  Proc( c boo)
          Ile) = bool
                                       Tyar
                                                              2 if b trun zero? (0)
                                                                                                                                                                 Elt c then zero? (1)
                                                                             else zero? (1)3: bool -> bool
                                                                                                                                                                                  elsc zero? (0)3: 6001->6001
         E[a:6001] ta:6001
                                                                                                                                                                                  - TIP
            a: bool r if a
                                  then proc (b.pool) { if b men zero? (o) else zero? (1) }
                                  else moc (c: bool) { if c thin zero? (i) else zero? (o)} : bool + bool
Etproc (a: bool) & if a
                                                          then proc (b:bool) { if b then zero? (o) else zero? (1) }
                                                         elx proc (c: bool) { if c then zero? (1) else zero? (0)}}:
                                                                                                                                                                          (lood + lood) + lood)
```

The obove type judgment is derivable, therefore, the expression proc (a:bod) ξ if a

then proc (b:bool) { if b then zero? (a) else zero? (1) } else proc (c:bool) { if c then zero? (1) else zero? (0)}}

is typoble.