

Quiz 8: Closures

EN.601.426/626 Principles of Programming Languages – SP26

Name: _____

Let's look at the following F^b code. Let's assume that we are evaluating the code with the closure augmented semantics, that is $\rho \vdash e \Rightarrow v$, $\rho = \{x_i \mapsto v_i\}_i$ where values are augmented, and the declaration of function always evaluates to a closure.

$$v ::= (\dots \text{ other F}^b \text{ values } \dots) \mid \langle \text{Fun } x \rightarrow e, \rho \rangle \text{ (Closure)}$$

```
Let f = Fun x ->
  Let a = Ref x In
  Let Rec g y =
    If y > 10 Then
      a := !a - 1;
      g (y - !a)
    Else
      y + !a
  In
  g
In
Let h = f 5 In
h 15
```

What is the final result of evaluating the above code?

How many closures are created during the evaluation of the above code? Let's use F to denote the code of f , and G to denote the code of g . For each closure created, please specify the code and the environment captured by the closure.