

Quiz 3: Free Variables and Substitutions

EN.601.426/626 Principles of Programming Languages – SP26

Name: _____

Let p = q + p In (Fun q -> q + p) 3
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(1) (2) (3) (4) (5) (6)

1. Is the variable q (2) free or bound? If bound, what is its binder?
2. Is the variable q (5) free or bound? If bound, what is its binder?
3. Is the variable p (6) free or bound? If bound, what is its binder?
4. Suppose the above expression is e . Perform the substitution $e[10/q]$:
5. Is the following statement correct: $\exists v, e[10/q] \Rightarrow v$? If so, what is v ?

(Fun x -> x x) (Fun x -> x x)

6. Is the above expression well-typed? What is the type, or why not?
7. Suppose the above program is Ω . Is the following statement correct: $\exists v, \Omega \Rightarrow v$? If so, what is v ?