Principles of Programming Languages - Homework 1

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1   Problem 1

(a)

The use of pi at line 4 is bound at which line? Line 3
The use of pi at line 7 is bound at which line? Line 1

(b)

The use of x at line 3 is bound at which line? Line 2
The use of x at line 6 is bound at which line? Line 5
The use of x at line 10 is bound at which line? Line 5
The use of x at line 13 is bound at which line? Line 1

2   Problem 2

Is the body of g well-typed? Yup!
If so, give the return type of g and explain how you determined this type.
The return type of g would be (Int, Int).
For this explanation, first, give the types for the names a and b.
Type of a is an Int. The reasoning stands from:
val (a, b) = (1, (x, 3))

    a: Int
    1: Int
    val a = 1
    val _ = 1 $=> Int$
One portion of the return could either be:
a + 2 : Int because

    a : Int
    2 : Int
    $_ + _ : (Int, Int) => Int$
Or

    1 : Int

Type of b is a Tuple of (Int, Int). The reasoning stands from:
val (a, b) = (1, (x, 3))
    b: (Int, Int)
    x: Int
    3: Int
    (x, 3): (Int, Int)
    val b = (x, 3) => (Int, Int)

3   Problem 3

(d) ii.

No mutable variables? Yup!
Is your implementation tail-recursive? Yes it is!