

CSCI 3155: Lab Assignment 1 PDF

Spring 2015: Due Sunday, February 8, 2015 by 23:00 MST

1. **Scala Basics: Binding and Scope.** For each the following uses of names, give the line where that name is bound. Briefly explain your reasoning (in no more than 1–2 sentences).

(a) Consider the following Scala code.

```
1  val pi = 3.14
2  def circumference(r: Double): Double = {
3    val pi = 3.14159
4    2.0 * pi * r
5  }
6  def area(r: Double): Double =
7    pi * r * r
```

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

- The use of pi at line 4 is bounded to the value pi at line 3, while the use of pi in line 7 is bounded by the value of pi on line 1. The function area would not be able to see line 4 pi, due to its scope, while the function circumference will use the value pi at line 4, since it's in the function.

(b) Consider the following Scala code.

```
1  val x = 3
2  def f(x: Int): Int =
3    x match {
4      case 0 => 0
5      case x => {
6        val y = x + 1
7        ({
8          val x = y + 1
9          y
10         } * f(x - 1))
11      }
12    }
13  val y = x + f(x)
```

The use of x at line 3 is bound at which line? The use of x at line 6 is bound at which line? The use of x at line 10 is bound at which line? The use of x at line 13 is bound at which line?

- The x used at line 3 is bound to the x parameter for function f, on line 2.
- The x used at line 6 is also bound to the x parameter for function f, on line 2.
- The x used on line 10 is bound to the new value x defined on line 8.
- The final x used on line 13 are also bound to the parameter for function f, on line 2

3. **Scala Basics: Typing.** In the following, I have left off the return type of function g. The body of g is well-typed if we can come up with a valid return type. Is the body of g well-typed?

```

1      def g(x: Int) = {
2          val (a, b) = (1, (x, 3))
3          if (x == 0) (b, 1) else (b, a + 2)
4      }
```

If so, give the return type of g and explain how you determined this type. For this explanation, first, give the types for the names a and b. Then, explain the body expression using the following format:

$e : \tau$ because $e_1 : \tau_1$
 because
 ...
 $e_2 : \tau_2$ because
 ...

where e_1 and e_2 are subexpressions of e . Stop when you reach values (or names).

- No, the body of the function g isn't well-typed.
 Val (a,b) = (1, (x, 3)) because
 a: val
 b: val
 x: int
- The function uses values and integers, two different types, making this function not type safe.