

# CSCI 3155 Lab 1

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1. **Feedback.** Lab 1 Feedback survey has been completed on the Moodle

## 2. Scala Basics: Binding and Scope.

- (a) The use of `pi` at line 4 is bound at the declaration of `pi` at line 3.  
The use of `pi` at line 7 is bound to the declaration of `pi` at line 1.  
The uses are bound within their respective "nests" (created by curly braces which define the current scope). If the declaration of `pi` is not found within the level that its use is called, we look for the value of `pi` in the next higher level "nest", that is, the environment outside of which the use of `pi` is nested in.
- (b) The use of `x` at line 3 is bound at line 2 in the function definition, which is called on line 13 with the value `x` set on line 1.  
The use of `x` at line 6 is also bound at line 2 in the function definition.  
The use of `x` at line 10 is also bound at line 2.  
The use of `x` at line 13 is bound at line 1 as it is completely outside of the function definition.

## 3. Scala Basics: Typing

The function `g` is well-typed and returns a nested tuple, `((Int,Int),Int)`. This can be shown by examining the body of the function:

- 1. `(a,b): (Int,(Int,Int))` because
  - 1.1 `1: Int`
  - 1.2 `(x,3): (Int,Int)` because
    - 1.2.1 `x: Int`
    - 1.2.2 `3: Int`
- 2. `(b,1): ((Int,Int),Int)` because
  - 2.1 `b: (Int,Int)` because
    - 2.1.1 `(a,b): (Int,(Int,Int))`, shown by expression 1

4.

- 5. 2.2 `1: Int`
- 3. `(b, a+2): ((Int,Int),Int)` because
  - 3.1 `b: (Int, Int)` because
    - 3.1.1 `(a,b): (Int,(Int,Int))`, shown by expression 1
  - 3.2 `a+2: Int` because
    - 3.2.1 `a: Int` because
      - 3.2.1.1 `(a,b): (Int,(Int,Int))`, shown by expression 1
    - 3.2.2 `2: Int`

Because expressions 2 and 3 are both possible returned values and are well-typed tuples `(Int,Int),Int)`, the function `g` is well-typed.

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