

Administrivia

Slide 1

- Reminder: Homework 3 due Tuesday.
- Reminder: Quiz 2 Tuesday. Chapters 3 and 4, not 5.
Questions might be of the form “what does this Scala code do?” or “write some Scala code to do the following task”. (For the latter, I am less picky about syntax details than the compiler/interpreter.)
- `vi` tip: If you put the cursor on a parenthesis or brace, `vi` will highlight it and its match, if it has one. Very helpful in diagnosing some kinds of problems!

Minute Essay From Last Lecture

Slide 2

- Most people found the quiz more or less what they thought it would be.
- Several people mentioned some difficulties with details of program syntax and with the new material Tuesday. More examples and practice should help!
- How to control how many digits Scala prints for a floating-point result (or I think that was the question)? Probably lots of ways to do this. One, briefly, today.
- Can functions take different numbers of arguments (e.g., function to sum any number of things)? Yes, but we won't get to that until quite a bit later. Maybe for now just know that it can be done?

Functions in Scala — Review/Recap

- Why functions? reduce duplication, “manage complexity”, allow code reuse.
- Define functions with keyword `def`, name, parameters, return type, body.

Simple example:

```
def sum(x : Int, y : Int) : Int = x + y
```

- Use functions by giving name, values for parameters in parentheses.

Examples:

```
val x = sum(10, 20)
```

```
println("x plus 1 = " + sum(x, 1))
```

Notice that values for parameters can be expressions.

Slide 3

Functions, Variable Scope, and Scala

- In many programming languages, every variable has a *scope* — the part of the program within which it has meaning and can be referenced.
- In Scala, the scope of a variable starts with its declaration and continues to the end of the block. Notice that a program might have different variables with the same names and different scopes. Simple example:

```
def printIt(x : Int) { println(x) }
```

```
val x = 10
```

```
printIt(20)
```

What prints? Why?

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Slide 5

Sidebar: User Input in Scala

- We've been using `readInt` to get input from the person running our programs. This is simple, but if the human types something other than a number, including a number preceded by spaces, the program "crashes".
- This is somewhat ugly, but arguably better than what some other programming languages do, which is to provide some sort of error indication that programmers can ignore, in which case the program will probably go wrong in some mysterious way.
- Scala instead uses an *exception* to indicate the error. By default, an exception crashes the program. Programmers can deal with them more gracefully. That won't be covered in detail until POP II — focus for now on programming logic — though later this semester we will talk about the basics.

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Sidebar: Formatted Output in Scala

- Remember that you can build up strings to print using string concatenation (the "+" operator when one operand is a string) and the fact that Scala knows how to turn most things into `Strings`. We don't yet have a way to make floating-point numbers print nicely. Later.
- Or ... for anyone who has seen `printf` in another language, Scala has that too, e.g.,

```
val x = 2
println("square root of " + x + " = " + math.sqrt(x))
printf("square root of %d = %f", x, math.sqrt(x))
```

and if we replace `%f` in the first parameter to `printf` with `%.2f`, the result prints with only two digits after the decimal point.

Example Continued — Finding Roots of a Quadratic Equation

- As a rather math-y example, let's write a function to compute and print the roots of a quadratic equation

$$ax^2 + bx + c = 0$$

- We'll use the formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

and try to account for as many cases as we can . . .

- (We will just write the function for now, and test it interactively — load it into the REPL with `:load.`)

Slide 7

Minute Essay

- What did you find interesting about the problems for Homework 2? What did you find difficult?
- About how long did you spend on Homework 2 (if you know or can estimate)?

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