Lecture 11
Review

"But Boss, I just left out a decimal point. Don’t I at least get partial credit?"
Loops and Ifs

- for (i=0; i<n; i++) {...}
- while (!done) {...}
- do {...} while (!done);
- if (doit) {...}
- if (doit) {...} else {...}

Operators and Expressions

- Arithmetic:  +, -, *, /
- Logical:  |, &&, !, ==, <, <=, >, >=, !=
- Assignment:  =, +=, -=, *=, /=
- Unary:  ++, --, -
Comments
Comments are notes to the human reader of the code.

Two types:
- /* ... */ - good for spanning several lines
- // - good for short comments

Operators and Expressions

- Types:
  - double
  - int
  - boolean
- Declare, initialize, use
- Scope: A variable exists everywhere between the nearest set of enclosing braces, even within further nested braces unless it is hidden by another variable of the same name.
Arrays

- Declaration: `double[] x;`
- Instantiation: `x = new double[43];`
- Usage: `x[23]`
- Pointer: `x` alone is a pointer

Classes

- Definition: `class Foo {int v1; int v2; ...}`
- Declaration: `Foo f;`
- Instantiation: `f = new Foo();`
- Initialization: `f.v1 = m1;`
- Access: `v = f.v1;`
- Pointer: `f` alone is a pointer
- Class methods: classes can contain methods
String constants are enclosed in quotes: "this is a string"

String variables:

• Declaration: `String s;`
• Instantiation: `s = new String("Hello there"); s = "Hello there";`
• Concatenation: `s1 + s2`
• Comparison: `if (s.equals("Hi")) {...}
• Pointer: `s` alone is a pointer
• `String` is an example of a derived class
Methods

- Definition: `double foo(int x, double y, ...) { ... }
- Argument list: zero or more inputs
- Return value: if non-void, must `return` something
- Usage: `z = foo(xx, yy);`
- Methods are `call by value`
- Arguments that are pointers (arrays and derived classes) pass the value of the pointer -- things to which it points can be changed in the calling method.
- Recursion: a method can call itself -- sometimes convenient (see `Factorial.java`)
Algorithms

- Searching
  - Binary
  - Sequential (bruteforce)
- Sorting
  - Bubble sort
  - Quick sort
  - Insertion sort
- Newton’s method (sqrt)

Complexity

- Difference between log $n$, $n$, $n^2$, $n^3$, and $2^n$
- worst case vs. average case