Topics: Parts of a Java program; types; variable, declaration and assignment; DrJava demo  
Reading: (Java text) Chapter 1 (exclude pp 36-42 on Classes & String methods), Sec 2.1

Java Program Structure

In the Java programming language:
- A program is made up of one or more classes
- A class contains one or more methods
- A method contains program statements
A Java application always contains a method called main

```java
// Our first Java program  (What does it do?)
public class Mystery {
    public static void main(String[] args) {
        System.out.print( (12-32)*5/9.0 );
    }
}
```

Comments

// this comment runs to the end of the line

/* this comment runs to the terminating symbol, even across line breaks */

/* Here is a nicer looking (?) comment format  
* that many programmers use.  
*/

Type

A type is a set of values along with a set of operations on those values.  E.g., the set of integers
\{…, -2, -1, 0, 1, 2, …\} along with the arithmetic operations
\(+\, -\, *\, /\, %\)

Primitive Data: 8 types

Four types of integers: byte, short, int, long
Two types of floating point numbers: float, double
One character type: char
One logical type: boolean (only two valid values: true, false)

We will use four primitive types most of the time: int, double, char, boolean
**Integer Division and Remainder Operator**

If both operands to the division operator `/` are integers, the result is an integer.

The remainder operator `%` is an arithmetic operator that returns the remainder after dividing the second operand into the first.

**Variable, Declaration, Assignment**

- A variable must be declared: specify variable's name and type of information that will be held in it
- Multiple variables can be created in one declaration statement
- In an assignment statement, the expression on the right is evaluated and the result is stored in the variable on the left
- Can declare a variable and assign an initial value to it in one statement.

```java
int total;  // declarationint count, tmp, result;
total= 200;  // assignment
int sum= 0;  // combine declaration and assignment
int base=32, max=149;

final int MIN_HEIGHT = 149;  // declare a constant and assign its value
```

**Data Conversion**

*Arithmetic promotion:* operators in expressions convert their operands

*Casting:* explicit conversion by specifying the type desired

*Assignment conversion:* a value of one type is assigned to a variable of another type

*Widening conversions* are safe: go from small data type to larger one (e.g., a `short` to an `int`).

*Narrowing conversions* can lose information: go from large data type to smaller one (e.g., an `int` to a `short`).

**The Math class**

A collection of basic mathematical functions.

```java
double tmp = Math.exp(1);
tmp = 3*Math.sin(2);
tmp = Math.floor(3*Math.sin(2));
tmp = Math.random();
```

**The boolean type**

Represent conditions or states `true` or `false`. There're only two valid values for boolean type: `true, false`.

Relational operators: `<, >, <=, >=, ==, !=`

Logical operators: `&&, ||, !`