Topics:  Parts of a Java program; types; variable, declaration and assignment; DrJava demo

Reading:  (GG) Sec 1.1, 1.2; (PL) Lesson page 1-3

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.random();
tmp = Math.floor(Math.random());
```