CS161
Intro to Computer Science I
Data Concepts & Variables
Chap. 2.1 – 2.2

Data Type

• What is data?
  – Information
  – Ex: System.out.println("Hello World!")
• What is a data type?
  – Description of the kind of information
    • Primitive Data
    • Objects

Primitive Types

• boolean, byte, char, double, float, int, long, short
• Fundamental
  – int: whole numbers, e.g. 45, -89, 0
  – double: real numbers, e.g. 2.612, -30.5, 2.3e5
  – char: characters, e.g. 'A', '&', 'x', '\'
  – boolean: logical values, i.e. true, false
Expressions

• What is an expression?
  – Simple value
    • Literals, e.g. 23, 79.5, “Hello”, etc.
  – Set of operations producing a value
    • Combining simple values
      12 * 4 + 6 * 10 vs. ((12 * 4) + 6) * 10

Expressions cont.

• Pieces of an Expression:
  – Operators
    • Indicate operation, e.g. +, *, /, -, %
  – Operands
    • Values in the expression
  – Evaluation
    • Process of obtaining results from operations on operands

Arithmetic Operators

• Add
  34 + 23
• Subtract
  34 - 23
• Multiply
  2 * 23
• Divide
  40 / 10
• Remainder/Mod
  34 % 5
Arithmetic

• Integer Arithmetic
  System.out.println(34/5);  /*prints 6*/
  System.out.println(3/8);  /*prints 0*/
• Floating Point Arithmetic
  System.out.println(34.0/5.0);  /*prints 6.8*/
  System.out.println(3.0/8.0);  /*prints .375*/

Precedence

• What is precedence?
  – Binding power of operator
    – (*, /, %) vs. (+, -)
• How do we override precedence?
  – Parenthesis!
• Examples:
  12 * 4 + 6 * 10 vs. ((12 * 4) + 6) * 10

Mixing Types

• Mixed Arithmetic /*All print 6.8*/
  System.out.println(34./5);
  System.out.println(34/5.);
  System.out.println(34/5.0);
  System.out.println(34.0/5);
  System.out.println(34./5.);
  System.out.println(34.0/5.0);
Type Casting

- Casting
  System.out.println(34 / (int) 5.0); /*prints 6*/
  System.out.println((int) (34 / 5.0)); /*prints 6*/
- Why doesn’t this print 6?
  System.out.println((int) 34 / 5.0); /*prints 6.8*/

Variables

- What is a variable?
  – Memory location with name and type to store value
- What is a declaration?
  – Statement requesting variable w/ name and type
  – Examples:
    double height;
    int age;

Variables

- How do we get a value in the variable?
  – Assignment Statement
    int age;
    age = 20;
    Or
    int age = 20;
  – = IS NOT equal to!!!!!
    • “gets” or “is assigned”
BMI Calculator

```java
public class BMICalculator {
    public static void main(String[] args) {
        // declare variables
        double height;
        double weight;
        double bmi;

        // compute BMI
        height = 70;
        weight = 195;
        bmi = weight / (height*height) * 703;

        // print results
        System.out.print("Current BMI:");
        System.out.println(bmi);
    }
}
```