American University of Beirut
Department of Computer Science
CMPS 200 – Introduction to Programming
Assignment 1: Feb 8 – Feb 15

Exercise 1. Expressions – Order of Precedence

Write the expression that divides a number x by 20 and raises the answer (the integer part) to the power 3 then adds it to the remainder of the division multiplied by 2. Test it on some values. Examples: For x = 45, the answer should be 18; For x = 129, the answer should be 234.

Exercise 2. Line Equation

A line equation is in the format of: **y = Ax + B** where ***A*** is called the **slope**, and ***B*** is called the **y-intercept**. Having two points over this line: P1 (x1, y1) and P2(x2, y2) (where x1, y1, x2, y2 are known), the slope can be calculated as:

$$A = \frac{y2-y1}{x2-x1}$$

To find the **y-intercept**, you can use the coordinates of one given point and the calculated intercept to apply the equation: y = Ax + B (where the only unknown is b). So B = y – ax (for a given point (x, y)).

- Create a method that takes four doubles as the coordinates of two different points on a line. This method should display the line equation after calculating the slope and the y-intercept as: y = Ax + B.

Exercise 3. Day of the Week

Create a method that accepts a date value in the format of three parameters: m(for the month), d (for the day), and y (for the year). It will then return the day of the week on which that date falls (a value between 0 and 6). For the month, use 1 for January, 2 for February, and so forth. Use the following formulas, and note that all divisions are meant to be integer divisions:

$$y_0 = y - \frac{14-m}{12}$$
$$x = y_0 + \frac{y_0}{4} - \frac{y_0}{100} + \frac{y_0}{400}$$
$$m_0 = m + 12 \times \left[\frac{14-m}{12}\right] - 2$$
$$d_0 = \left[d + x + \frac{31m_0}{12}\right] \bmod 7$$

Test your method on different values.

Exercise 4. Math Methods

Evaluate the following expressions (you can write a program to print them out and copy the answers). Use the right data type when displaying the output (such as including decimal point when returning a double):

```
Math.abs(4 + -7 - 10))
Math.abs(4 + -7 - 10);
Math.abs(-19.8);
Math.pow(5, 2);
Math.pow(5, 2.0);
Math.ceil(98.1);
Math.floor(76.9);
Math.max(12, 90);
Math.min(120, 90.1);
Math.sqrt(36);
Math.sqrt(29 + 37);
Math.log(Math.pow(Math.E, 4));
Math.round(4.8);
```

Exercise 5. Minimum of Three Numbers

- Write a method, getMin, that takes three integers and returns the smallest one. You can use the Math.min in your solution.
- Overload your method to take three doubles and returns the smallest one.
- Implement your main method in a way to test the two created methods.

Exercise 6. String Methods

Check the list of string methods included in the slides posted on Moodle, then use the appropriate methods to write a program to do the following:

- Declare a string with the text: “Programming is fun!”
- Display:
  - the number of characters in the declared string
  - the first character and the last character
  - the first three letters substring
  - the substring from the 5^{th} character till the end
  - the character at the 6^{th} position
  - the position of the first space
  - a copy of the string with all upper case letters
- Use any other string method and check its output