CS161FZ Introduction to Computer Science 1
Lab Assignment 2

Task 1: Printing Variables

Note: You must use the variable names given. You must name your source file "PrintingVariables".

Write a Java program that:

1. Declares an integer variable, called *num1*, and sets its value to be *5*.
2. Declares a double variable, called *num2*, and sets its value to be *2.3*.
3. Declares a character variable, called *letter*, and sets its value to be '*s*'.
4. Prints each of the above initialised variable on a new line.

Sample Output:
5
2.3
s

Task 2: Modulus – 3 digit

Note: You must use the variable names given. You must name your source file "UsingMod".

Write a Java program that uses an *int* variable called *num* that stores a 3-digit number. Your program should then break up this number using the modulus operator into its component digits and print the message exactly as given below. Make sure to test your program with another 3-digit number!

Sample Output:
The digits in the number 123 are:
1
2
3

Taks 3: Arithmetic - Addition, Multiplication & Division

Description

Note: You must use the variable names given. You must name your source file "ArithmeticOperations".

Write a java class and in its main method:

1. Declare integers, called *num1* and *num2*, with values of 10 and 5 respectively.
2. Declare integers called *result1*, *result2* and set each to a default value of 0.
3. Declare a double called *result3* and set it to the value 0.0.
4. Add *num1* and *num2* together and store the result in *result1*.
5. Multiply *num1* by *num2* and store the result in *result2*.
6. Divide *num1* by *num2* and store the result in *result3*.
7. Print the values stored in the variables *result1*, *result2* and *result3* to the screen, each on a new line using the same structure as shown in the sample output below.

Sample Output

Addition: 15
Multiplication: 50
Division: 2.0

Task 4: Application Scenario: Predicting Sales based on the Advertising Expenditure

Description

In machine learning, linear regression is a very straightforward approach for predicting a quantitative response ***Y*** on the basis of a single predictor variable ***X***. It assumes that there is approximately a linear relationship between ***X*** and ***Y***. Mathematically, we can write this linear relationship as

$$Y \approx \beta_0 + \beta_1 X$$

In our application scenario, X represents the amount of money spent on advertising a brand of television, Y represents the sales.

Using linear regression, we assume television advertising and sale have some linear relationships, i.e.,

$$sale \approx \beta_0 + \beta_1 * advertising$$

Using this simple linear regression equation, we can predict the sale based on how much we are willing to pay for advertisement, e.g., if the company is willing to pay 1000 US dollars on advertising their television, how many televisions the company will sell?

In order to use linear regression for prediction, we must find out what are the $\beta_0 \; and \; \beta_1$.

β_0 and β_1 can be estimated as

$$\beta_1 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

$$\beta_0 = \bar{y} - \beta_1 \bar{x}$$

whereas, $\bar{y}$ is the average of Y, $\bar{x}$ is the average of X, Σ is the summation of all elements.

Given some information about the history of the company's sales:
(X, Y) = {(230.1, 22.1), (44.5, 10.4), (17.2, 9.3), (151.5, 18.5), (180.8, 12.9), (8.7, 7.2), (57.5, 11.8), (120.2, 13.2), (8.6, 4.8), (199.8, 10.6)}

You tasks is to predict if the company spend 350 US dollars on advertisement, how many televisions the company will sell out.

Note: You must name your source file "SalePrediction". The output of your program is a single number indicating how many televisions will be sold out. Don't forget to submit your source file to Moodle to Lab-2, Task-4.