GIFT School of Engineering and Applied Sciences

Fall 2020

CS-124: Introduction to Programming Lab

Lab-3 Manual

Java Fundamentals – Part - II

Task #1: Using correct numeric datatypes

In this task, you are being asked to write a program that calculates the average of numbers.

1. Create a program called **Averages.java** having the main() part.

2. Create five integer variables called **number1** to **number5.** Assign proper values to these five variables.

3. Create a variable called **sumIntegers** and assign the sum of all five variables to **sumIntegers.**

4. Create a variable called **averageIntegers,** and assign the average of all five variables to **averageIntegers.**

5. Use the formula: **average = sum of all numbers / count of numbers.**

6. Print all five numbers, their sum, and their average by giving appropriate messages.

7. Repeat the same exercise for five double variables (**number6** to **number10**).

8. Create variables to store their sum and calculate their average.

9. Print all five numbers, their sum, and their average by giving appropriate messages.

Task #2: Writing correct expressions

In this task, you are being asked to write a program that converts temperature to Fahrenheit or Centigrade.

1. Create a program called **Temperature.java** having the main() part.

2. Create a variable called **tempCentigrade,** and another called **tempFahrenheit,** both of type double.

3. Assign a value **68.5** to **tempFahrenheit** and **-273.15** to **tempCentigrade.**

4. Now, you need to convert the value stored in **tempCentigrade** to Fahrenheit, and the value stored in **tempFahrenheit** to Centigrade.

5. Use the following two formulae to convert the Centigrade to Fahrenheit, and vice versa:

$$T_{(°C)} = (T_{(°F)} - 32) \times 5/9$$

$$T_{(°F)} = T_{(°C)} \times 9/5 + 32$$

6. Print the converted temperatures by giving appropriate messages.

Task #3: Writing and evaluating expressions

In this task, you are being asked to understand the evaluation order of various operators.

Complete the following table by writing the value of each expression in the Value column **without using a calculator and the computer**.

Expression	Value
6 + 3 * 5	
12 / 2 − 4	
9 + 14 * 2 - 6	
5 + 19 % 3 - 1	
(6 + 2) * 3	
14 / (11 - 4)	
9 + 12 * (8 - 3)	

Now, crate a program called **Expressions.java,** and write output statements and print both the expression and its value.

Task #4: Integer and floating-point division

In this task, you are being asked to understand the difference between integer and floating-point division in Java.

Complete the following table by writing the value of each expression in the Value column **without using a calculator and the computer**.

Expression	Value
6 / 3	
12 / 5	
12 % 5	
12 / 5.0	
12.0 / 3.0	
1 / 3	
12.0 % 3.0	

Now, crate a program called **Divisions.java,** write output statements and print both the expression and its value.

Task #5: Combined assignment operators

In this task, you are being asked to understand and apply the combined assignment operators.

1. Create a program called **CombinedAssignment.java.**

2. Now, write statements using combined assignment operators to perform the following. You will need to declare and initialize the variables with appropriate values for writing each of the following statements:

   a. Add 6 to x

   b. Subtract 4 from amount

   c. Multiply y by 4

   d. Divide total by 27

   e. Store in x the remainder of x divided by 7

3. Now, print each statement and its output value.

Task #6: Correcting errors in a program

In this task, you are being asked to identify and correct the errors in a program.

There are a number of syntax errors in the following program. Locate and correct as many as you can.

```
*/ What's wrong with this program? /*
public MyProgram
{
public static void Main(String args);
}
int a; b, c        \\ Three integers
3 = a
b = 4
a + b = c
System.out.println('The value of c is' + C);
{
```

1. Create a program called **MyProgram.java.**

2. Type the program as given above.

3. Correct all errors.

4. Run and see the output.

Task #7: Using E (or e) notation

In this task, you are being asked to correctly use the **E / e** notation to represent floating-point numbers.

First, write each of the below numbers as floating-point numbers without using the powers of 10 by hand (no calculators please).

Second, how would each of the following numbers be represented in **E / e** notation?

```
a.  3.287 × 10⁶
```

```
b.   -9.7865 × 10¹²
```

```
c.  7.65491 × 10⁻³
```

```
d.  -153.5432 × 10⁻⁵
```

1. Create a program called **ENotation.java.**

2. Create three appropriate variables to store the above three given numbers as E notation.

3. Print each statement and its output.

Task #8: Converting word problems into programs

In this task, you are being asked to write a given word problem as a program.

The East Coast sales division of a company generates 62 percent of total sales. Based on that percentage, write a program that will predict how much the East Coast division will generate if the company has $4.6 million in sales this year (1 million = 1,000,000).

1. Create a program called **Sales.java.**

2. Create appropriate variables with values as given in the statement above.

3. Run and print the required value.

Task #9: Converting word problems into programs

In this task, you are being asked to write a given word problem as a program.

One acre of land is equivalent to 43,560 square feet. Write a program that calculates the number of acres in a tract of land with 389,767 square feet.

Hint: Divide the size of the tract of land by the size of an acre to get the number of acres.

1. Create a program called **LandCalculation.java.**

2. Create appropriate variables with values as given in the statement above.

3. Run and print the required value.

Task #10: Converting word problems into programs

In this task, you are being asked to write a given word problem as a program.

Create a variable to store the amount of a purchase as a real value. The program should then compute the state and county sales tax. Assume the state sales tax is 4 percent and the county sales tax is 2 percent. The program should display the amount of the purchase, the state sales tax, the county sales tax, the total sales tax, and the total of the sale (which is the sum of the amount of purchase plus the total sales tax).

1. Create a program called **SalesTax.java.**

2. Create appropriate variables with values as given in the statement above.

3. Run and print the required values.

Task #11: Converting word problems into programs

In this task, you are being asked to write a given word problem as a program.

Write a program that computes the tax and tip on a restaurant bill. Create a variable to store the charge for the meal as a real vale. The tax should be 6.75 percent of the meal charge. The tip should be 20 percent of the total after adding the tax. Display the meal charge, tax amount, tip amount, and total bill on the screen.

1. Create a program called **RestaurantBill.java.**

2. Create appropriate variables with values as given in the statement above.

3. Run and print the required values.

Task #12: Converting word problems into programs

In this task, you are being asked to write a given word problem as a program.

A cookie recipe calls for the following ingredients:

- 1.5 cups of sugar
- 1 cup of butter
- 2.75 cups of flour

The recipe produces 48 cookies with these amounts of the ingredients. Create a variable that contains how many cookies are to be made (as an integer), and then displays the number of cups of each ingredient needed for the specified number of cookies.

1. Create a program called **Ingredients.java.**

2. Create appropriate variables with values as given in the statement above.

3. Run and print the required values.