Lab Assignment 02

Branching and Introduction to Loops



CSE110: Programming Language I

| **No of Tasks** | **Points to Score** |
| --- | --- |
| ***1*7** | ***170*** |

***[Submit all the Coding Tasks (Task 1 to 15) in the Google Form shared on buX. Submit the Tracing Tasks (Task 16 & 17) handwritten to your Lab Instructors before the next lab.]***

**Coding Tasks**

1. Write the Java code of a program to find the largest among three **given** numbers.

| **Given Numbers** | **Output** |
| --- | --- |
| 100  23  -4 | largest number: 100 |
| 5  17  -5 | largest number: 17 |

1. Write a Java program that prints the corresponding letter grade according to the following grading system based on a **given** score.

| **Scores** | **90-100** | **85-89** | **70-84** | **57-69** | **50-56** | **<50** |
| --- | --- | --- | --- | --- | --- | --- |
| **Grades** | A | A- | B | C | D | F |

| **Given Score** | **Output** |
| --- | --- |
| 9 | Your grade is F |
| 82 | Your grade is B |

1. Write a Java code of a program that determines if the given number is divisible by both 5 and 7; otherwise display “No”. For example, numbers like 35, 70, 105, 140, 175, 210, 245, 280 etc. can be divisible by both 5 and 7.

| **Given Number** | **Output** |
| --- | --- |
| 15 | Invalid: Divisible by 5 Only |
| 28 | Invalid: Divisible by 7 Only |
| 105 | Divisible by Both |
| 36 | No |

# 

1. Write a Java program that prints whether a given year is a leap year or not.

* A year may be a leap year if it is evenly divisible by 4.
* Years that are divisible by 100 (century years such as 1900 or 2100) cannot be leap years unless they are also divisible by 400.

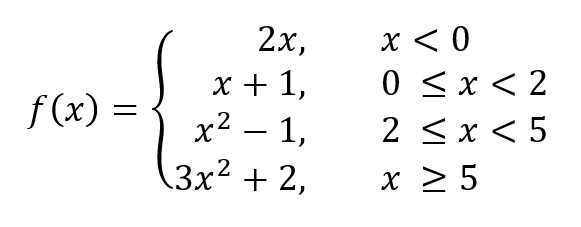
| **Given Year** | **Output** |
| --- | --- |
| 2020 | 2020 is a leap year |
| 2001 | 2001 is not a leap year |
| 1900 | 1900 is not a leap year |

1. Write a program which checks a given integer number to print any of the following outputs:

* If the number is negative, then print “Number is negative”
* If the number is zero, then print “Number is zero”
* If the number is positive and even, then print “Number is positive and even”
* And if the number is positive and odd, then print “Number is positive and odd”

| **Given Number** | **Output** |
| --- | --- |
| 5 | Number is positive and odd |
| -2 | Number is negative |
| 0 | Number is zero |

1. Let’s consider the following piecewise function:



Assuming x is an integer number; design a Java code of a program that displays the output based on the given piecewise function.

| **Given Number** | **Output** |
| --- | --- |
| -3 | output: -6 |
| 1 | output: 2 |
| 4 | output: 15 |
| 10 | output: 302 |

1. Given a BRACU Student ID, write a Java Program that prints out the year and the session the student enrolled in.

Hints:

* The first two digits denote the year the student got enrolled
* The 3rd digit denotes the session Student joined(Spring→1,Summer→3,Fall→2)

| **Given Student ID** | **Output** |
| --- | --- |
| 16101307 | Student Joined BRAC in Spring 16 |
| 19301307 | Student Joined BRAC in Summer 19 |
| 20201307 | Student Joined BRAC in Fall 20 |

1. Write the Java code of a program that calculates the tax and prints it as follows:

a) No tax if you get paid less than 10,000

b) 5% tax if you get paid between 10,000 and 20,000 (both inclusive)

c) 10% tax if you get paid more than 20,000

d) NO TAX IF YOU ARE LESS THAN 18 YEARS OLD.

Hint: Assign values to payment and age variables according to your choice; then calculate tax and print it.

| **Given Values** | **Output** |
| --- | --- |
| 9000  23 | Your tax amounts in 0 Tk |
| 15000  17 | Your tax amounts in 0 Tk |
| 15000  18 | Your tax amounts in 750 Tk |
| 30000  25 | Your tax amounts in 3000 Tk |

1. Write a Java program that prints the maximum and minimum number from 3 given double numbers.

| **Given Number** | **Output** |
| --- | --- |
| 18.83  -4.02  83.12 | Maximum number is 83.12  Minimum number is -4.02 |
| 26.45  0.02  13.56 | Maximum number is 26.45  Minimum number is 0.02 |

1. A triangle has 3 sides. Based on the 3 sides, write a Java program that displays whether it is an Equilateral, Isosceles or Scalene.

* Equilateral triangle has three sides with equal length
* Isosceles triangle has two sides with equal length and another side is different
* Scalene triangle has different lengths in each side

| **Given Sides** | **Output** |
| --- | --- |
| 5 2 4 | This is a Scalene triangle |
| 5  5  3 | This is a Isosceles triangle |
| 3 3 3 | This is a Equilateral triangle |

1. Suppose you are hired by a grocery store called “Bastob”. Now, your task is to create a Java program that will help the cashier calculate the change to be returned.

The program has two variables. First value is an integer number which is the amount of money to be paid in taka and the second integer value is the amount of money the customer gave to the cashier. Your program should print the following:

* If the customer gave more money than the actual amount, print change the cashier should return in notes and coins.
* If the customer gave less money than the amount to be paid, then print the amount the customer needs to pay.

Consider the following denomination for notes and coins in taka:

Notes: 100, 50, 20, 10.

Coins: 5, 2, 1.

| **Given Values** | **Output** |
| --- | --- |
| The customer need to pay(Taka)  35  Customer gave (Taka)  53 | The returned amount is 18 taka.  100 taka note: 0  50 taka note: 0  20 taka note: 0  10 taka note: 1  5 taka coin: 1  2 taka coin: 1  1 taka coin: 1 |
| The customer need to pay(Taka)  60  Customer gave (Taka)  500 | The returned amount is 440 taka.  100 taka note: 4  50 taka note: 0  20 taka note: 2  10 taka note: 0  5 taka coin: 0  2 taka coin: 0  1 taka coin: 0 |
| The amount the customer need to pay(Taka)  50  Customer gave (Taka)  50 | The returned amount is 0 taka. |
| The amount the customer need to pay(Taka)  550  Customer gave (Taka)  520 | Please pay 30 taka more. |

1. Based on three given integer numbers, write a Java program that prints "All numbers are equal" if all three numbers are equal, "All numbers are different" if all three numbers are different and "Neither all are equal or different" otherwise.

| **Given Numbers** | **Output** |
| --- | --- |
| 2345  2452  4532 | All numbers are different |
| 230  230  112 | Neither all are equal or different |

1. Write a Java code that would print the following sequences **using while/for loop**:

24, 18, 12, 6, 0, -6

1. Write a Java code that would print the following sequences **using while/for loop**:

-10, -5, 0, 5, 10, 15, 20

1. Write a Java program that finds the sum and average of numbers from 1 to 200 **using a while/for loop.**

**Tracing Tasks**

1. What will be the output of the following program? Show the workings.

| **1** | **public class Tracing1 {** | | **Output** | | --- | |  | |  | |  | |  | |  | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **public static void main(String[] args) {** |
| **3** | **int num1 = 10;** |
| **4** | **int num2 = -3;** |
| **5** | **int num3 = -1;** |
| **6** | **int sum = num1 + num2 + num3;** |
| **7** | **if (num3 < 0) {** |
| **8** | **System.out.println(num3 \* (-2));** |
| **9** | **}** |
| **10** | **else {** |
| **11** | **System.out.println(sum);** |
| **12** | **}** |
| **13** | **if (num1 < 5) {** |
| **14** | **System.out.println(num1 + 10);** |
| **15** | **}** |
| **16** | **else if (num2 == -3) {** |
| **17** | **num2 = num1;** |
| **18** | **System.out.println(num2);** |
| **19** | **}** |
| **20** | **else {** |
| **21** | **System.out.println(num1 + num2 + num3);** |
| **22** | **}** |
| **23** | **if (num1 > 15) {** |
| **24** | **System.out.println(num1);** |
| **25** | **}** |
| **26** | **if (num2 == 0) {** |
| **27** | **System.out.println(num2 + num3);** |
| **28** | **}** |
| **29** | **else {** |
| **30** | **System.out.println(num3);** |
| **31** | **}** |
| **32** | **if (sum != 0) {** |
| **33** | **System.out.println(100);** |
| **34** | **}** |
| **35** | **else {** |
| **36** | **System.out.println(sum + 100);** |
| **37** | **}** |
| **38** | **if (num1 > 0 && num2 < 0) {** |
| **39** | **System.out.println(num1 == num2);** |
| **40** | **}** |
| **41** | **else {** |
| **42** | **System.out.println("End");** |
| **43** | **}** |
| **44** | **}** |
| **45** | **}** |

1. What will be the output of the following program? Your answer will not be accepted without the workings.

| **1** | **public class Tracing2 {** |
| --- | --- |
| **2** | **public static void main(String[] args) {** |
| **3** | **boolean var1, var2, var3, var4, var5, var6;** |
| **4** | **boolean result1, result2, result3, result4, result5;** |
| **5** | **boolean result6, result7, result8, result9, result10;** |
| **6** | **var1 = var2 = var3 = var4 = var5 = var6 = false;** |
| **7** | **result1 = result2 = result3 = result4 = result5 = false;** |
| **8** | **result6 = result7 = result8 = result9 = result10 = false;** |
| **9** | **var1 = (!false || false) && true;** |
| **10** | **var2 = var1 && true;** |
| **11** | **var3 = false && !true;** |
| **12** | **var4 = true;** |
| **13** | **var5 = false;** |
| **14** | **var6 = var3 && true;** |
| **15** | **result1 = (var1 && var2) && (40 % 3 > 45) || (var5 && var6);** |
| **16** | **result2 = (var1 || var2) || (result1 && false);** |
| **17** | **result3 = (var1 && result1) || result2 || var5;** |
| **18** | **result4 = (var1 || var2) || ((var3 && var1) && false);** |
| **19** | **result5 = (var1 && var2) && (result3 || var1);** |
| **20** | **result6 = ((var3 || !var2) && result5) || true;** |
| **21** | **result7 = (var4 && result1) && ((result1 && false) || true);** |
| **22** | **result8 = ((var1 && result3) && (!var5 || var6)) && true;** |
| **23** | **result9 = ((result2 && var2) || (!result7 && var1)) && !false;** |
| **24** | **result10 = !(var1 && true);** |
| **25** | **System.out.println(result1 + " " + result2);** |
| **26** | **System.out.println(result3 + " " + result4);** |
| **27** | **System.out.println(result5 + " " + result6);** |
| **28** | **System.out.println(result7 + " " + result8);** |
| **29** | **System.out.println(result9 + " " + result10);** |
| **30** | **}** |
| **31** | **}** |

**Output:**

|  |
| --- |
|  |
|  |
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|  |