COMSATS University Islamabad
Department of Computer Science
Programming Fundamentals (CSC103) – BSCS-2A & 2B
Class Assignment – 1

Due Date: October 25, 2021 (11:59 pm)

Instructions

Total Marks: 10 x 5 = 50

Answer to all questions must be submitted in MS Word.

Answer to all questions should begin on new page.

Assignment document must contain a title page showing Assignment-1, your name and registration number.

Assignment document must also contain JAVA source code (For JAVA Programming Questions) along with output.

Solution to JAVA Programming problems must be created in separate .java file (for each question). For example, Question1.java

You must follow proper JAVA naming convention for identifiers and properly document your source code

Combine all your work in one folder. The folder must contain .JAVA source files (for JAVA Programming Questions) and a .doc/.docx file.

Name of the Assignment document file should be your Registration Number. E.g. FA21BCS01.docx

Submit your work via MS Teams

Plagiarism: Plagiarism is not allowed. If found plagiarized, zero marks will be awarded in the assignment.

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Question – 1: This question focuses on the types of errors

a. Write JAVA statements that can produce Syntax Errors. Give three different examples and write the names of errors
b. Write JAVA statements that can produce Logical Errors. Give three different examples and briefly explain the reason (1-2 lines)
c. Write JAVA statements that can produce Run Time Errors. Give three different examples and briefly explain the reason (1-2 lines)
d. The following program has syntax errors. Write clearly type of error and its correction (in tabular form). After you have corrected the syntax errors, show the output of this program.

```
public class Test{

   public static void main(String[] arg){

         count = 1;

         sum = count + PRIME;

         x := 25.67;

         newNum = count * ONE + 2;

         sum + count = sum;

         x = x + sum * COUNT;

         System.out.println(" count = " + count + ", sum = "

         + sum + ", PRIME = " + Prime);

   }

}
```

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Question – 2: This question focuses on the basic elements of JAVA language (comments, Special Symbols, Reserve Words and Identifiers)

Consider following JAVA Code

```
/*This program will calculate product of three numbers */
public class Product{
      public static void main(String[] args){
            int num1 = 10; // first number
            int num2 = 20; // second number
            int num3 = 1;// third number
            int result; //product of numbers
            result = num1 * num2 * num3;
            System.out.println("Product of numbers: "+result);
      }
}
```

You are required to identify following (Show your answer as tabular form)

- comments (Single Line, Multiline),
- Special symbols (three)
- Reserve words (three)
- Identifier (predefined and defined by user) (three each)
- Standard Input Stream Object
- Standard Output Stream Object

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Question – 3: This question focuses on the basic elements of JAVA language (Primitive Data Types, Expressions and Assignments, Arithmetic Operators, Order of Precedence, Augmented Assignment Operators, Type Conversion)

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a. Write Java statements that accomplish the following.

- Declare **`int`** variables **`x`** and **`y`**.
- Initialize an **`int`** variable **`x`** to **`10`** and a **`char`** variable **`ch`** to **`' B '`**.
- Update the value of an **`int`** variable **`x`** by adding **`5`** to it.
- Declare and initialize a **`double`** variable **`payRate`** to **`12.50`**.
- Copy the value of an **`int`** variable **`firstNum`** into an **`int`** variable **`tempNum`**.
- Swap the contents of the **`int`** variables **`x`** and **`y.`** (Declare additional variables, if necessary.)
- Suppose **`x`** and **`y`** are **`double`** variables. Output the contents of **`x`** , **`y`** , and the expression **`x +12/ y – 18`**.
- Declare a char variable grade and set the value of grade to **`'A'`**.
- Declare **`int`** variables to store four integers.
- Copy the value of a **`double`** variable **`z`** to the nearest integer into an **`int`** variable **`x.`**

b. Suppose a, b and c are `int` variables and a = 5, b = 6, d = 2. What value is assigned to each variable after each statement executes? If a variable is undefined at a particular statement, report UND (undefined)

Statements	a	b	c	d
`a = (b++) + 3 * ++d;`				
`c = 2 * d + (++b) + a;`				
`b = 2 * (++c) - (a++);`				
`d = d++ + d + b++ + b;`				

c. Suppose `a`, `b`, and `sum` are `int` variables and `c` is a `double` variable. What value is assigned to each variable after each statement executes? Suppose `a = 3 , b = 5,` and `c = 14.1`

Statements	a	b	c	sum
`sum = a + b + ( int) c;`				
`c /= a;`				
`b += (int) c - a;`				
`a *= 2 * b + (int) c;`				

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Question – 4: This question focuses on the Selection Structure in JAVA Language

a. Suppose that you have the following declaration:

```
int j = 0;
```

The output of the statement:

```
if ((8 > 4) || (j++ == 7))
      System.out.println("j = " + j);
```

is:

```
j = 0
```

while the output of the statement:

```
if ((8 > 4) | (j++ == 7))
      System.out.println("j = " + j);
```

is:

```
j = 1
```

Explain why?

b. Suppose that `x`, `y`, and `z` are `int` variables and `x = 10`, `y = 15`, and `z = 20`. Determine whether the following expressions evaluates to `true` or `false`.

Expression	Result
`!(x > 1 0)`	
`x <= 5 || y < 15`	
`(x != 5 ) && (y != z)`	
`x >= z || (x + y >= z)`	
`(x <= y – 2) && (y >= z) || (z – 2 != 20)`	

c. Rewrite the following expressions using the conditional operator

Expressions	**Conditional Operator**

`if (x >= y)`
`  z = x - y;`
`else`
`  z = y - x;`	

`if (hours >= 40.0)`
`  wages = 40 * 7.50 + 1.5 * 7.5 * (hours - 40);`
`else`
`  wages = hours * 7.50;`	

`if (score >= 60)`
`str = "Pass";`
`else`
`str = "Fail";`	

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JAVA PROGRAMMING QUESTIONS

Question – 5:

The two roots of a quadratic equation $ax^2 + bx + c = 0$ can be obtained using the following formula:

$$r_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad r_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

b^2 - 4ac is called the discriminant of the quadratic equation. If it is positive, the equation has two real roots. If it is zero, the equation has one root. If it is negative, the equation has no real roots. Write a program that prompts the user to enter values for a, b, and c and displays the result based on the discriminant. If the discriminant is positive, display two roots. If the discriminant is 0, display one root. Otherwise, display "The equation has no real roots".

Note that you can use **Math.pow(x, 0.5)** to compute $\sqrt{x}$. Here are some sample runs.

```
Enter a, b, c: 1.0 3 1 Enter
The equation has two roots -0.381966 and -2.61803
```

```
Enter a, b, c: 1 2.0 1 Enter
The equation has one root -1
```

```
Enter a, b, c: 1 2 3 Enter
The equation has no real roots
```

Question – 6:

Write a program that randomly generates an integer between 1 and 12 and displays the English month name January, February, …, December for the number 1, 2, …, 12, accordingly.

Question – 7:

Write a program that prompts the user to enter three integers and display the integers in non-decreasing order

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Question – 8:

Write a program that prompts the user to enter an integer for today's day of the week (Sunday is 0, Monday is 1, …, and Saturday is 6). Also prompt the user to enter the number of days after today for a future day and display the future day of the week. Here is a sample run:

```
Enter today's day: 1 Enter
Enter the number of days elapsed since today: 3 Enter
Today is Monday and the future day is Thursday
```

```
Enter today's day: 0 Enter
Enter the number of days elapsed since today: 31 Enter
Today is Sunday and the future day is Wednesday
```

Question-9:

An ISBN-10 (International Standard Book Number) consists of 10 digits: $d_1d_2d_3d_4d_5d_6d_7d_8d_9d_{10}$. The last digit, d_{10}, is a checksum, which is calculated from the other nine digits using the following formula:

$$(d_1 \times 1 + d_2 \times 2 + d_3 \times 3 + d_4 \times 4 + d_5 \times 5 + d_6 \times 6 + d_7 \times 7 + d_8 \times 8 + d_9 \times 9) \% 11$$

If the checksum is 10, the last digit is denoted as X according to the ISBN-10 convention. Write a program that prompts the user to enter the first 9 digits and displays the 10-digit ISBN (including leading zeros). Your program should read the input as an integer. Here are sample runs:

```
Enter the first 9 digits of an ISBN as integer: 013601267
The ISBN-10 number is 0136012671
```

```
Enter the first 9 digits of an ISBN as integer: 013031997
The ISBN-10 number is 013031997X
```

Question – 10:

Write a program that prompts the user to enter the month and year and displays the number of days in the month. For example, if the user entered month 2 and year 2012, the program should display that February 2012 had 29 days. If the user entered month 3 and year 2015, the program should display that March 2015 had 31 days.