Lab 2 –Primitive Data Types and Operations

Answer the following questions.

Use Scanner class for prompting the users for input.

Instructor-led Demo:

Write a program that reads a number in feet, converts it to meters, and displays the result. One foot is 0.305 meters.

EXERCISE:

1. Write a program that reads a Fahrenheit degree in double, then converts it to Celsius and displays the result on the console. The formula for the conversion is as follows:

   celsius = (Fahrenheit – 32) * 5 / 9

   Source code:

```
import java.util.Scanner;
public class Question1 {
    public static void main(String[] args){
        /* LAB TWO QUESTION 1 */
        // create input
        Scanner scanner = new Scanner(System.in);

        // prompt user to enter Fahrenheit temperature
        System.out.print("Enter temperature in Fahrenheit: ");
        double fahrenheit = scanner.nextDouble();

        // convert fahreinheit to celcius
        double celcius = (fahrenheit - 32) * 5 / 9;

        // display result
        System.out.println("The temperature in Celcius is: "+ celcius);

        // close the scanner
        scanner.close();
    }

}
```

   Output:

```
run:
Enter temperature in Fahrenheit: 30
The temperature in Celcius is: -1.1111111111111112
BUILD SUCCESSFUL (total time: 10 seconds)
```

2. Write a program that reads in the radius and length of a cylinder and computes volume using the following formulas:

   area = radius * radius * PI

   volume = area * length

   Source code:

```java
import java.util.Scanner;
public class Question2 {
    public static void main(String[] args){
        /* LAB TWO QUESTION 2 */
        // create a scanner object to read input
        Scanner scanner = new Scanner(System.in);

        // define the constant PI
        final double PI = 3.14159;

        // prompt the user to enter radius and length of cylinder
        System.out.print("Enter the radius of the cylinder: ");
        double radius = scanner.nextDouble();

        System.out.print("Enter the length of the cyliinder: ");
        double length = scanner.nextDouble();

        // calculate the area of the base
        double area = radius * radius * PI;

        // calculate the volume of the cylinder
        double volume = area * length;

        // display the result
        System.out.println("The volume of the cylinder is: "+ volume);

        // close the scanner
        scanner.close();
    }

}
```

Output:

```
run:
Enter the radius of the cylinder: 20
Enter the length of the cyliinder: 10
The volume of the cylinder is: 12566.36
BUILD SUCCESSFUL (total time: 10 seconds)
```

3. Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer. For example, if an integer is 943, the sum of all its digit is 16.

Source code:

```java
import java.util.Scanner;
public class Question3 {
    public static void main(String[] args){
       /* LAB 2 QUESTION 3 */
       Scanner scanner = new Scanner(System.in); // to scan
       System.out.print("Enter number between 0 to 1000: "); //for example i
       int number = scanner.nextInt();

       // check if the number is within the valid range
       if (number < 0 || number > 1000){
           System.out.println("Please enter a number between 0 and 1000.");
       } else {
           int sum = 0;
           while (number > 0){ // 123 is more than 0
               sum += number % 10; // 123 % 10 is 3, 3 adds to sum variable
               number = number / 10; // 123 / 10 is 12 then loop again to ch
           }
            System.out.println("The sum of all digit is: " + sum);

       }

       scanner.close();
    }

}
```

Output if the input is more than 1000 and less than 0:

```
run:
Enter number between 0 to 1000: 1350
Please enter a number between 0 and 1000.
BUILD SUCCESSFUL (total time: 1 minute 5 seconds)
```

```
run:
Enter number between 0 to 1000: -1
Please enter a number between 0 and 1000.
BUILD SUCCESSFUL (total time: 5 seconds)
```

Output if the input is between 0 and 1000:

```
run:
Enter number between 0 to 1000: 90
The sum of all digit is: 9
BUILD SUCCESSFUL (total time: 8 seconds)
```

4. Write a program that converts an uppercase letter to a lowercase letter.
   Source code:

```java
import java.util.Scanner;
public class Question4 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 4 */
        // input //
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter an uppercase letter: ");
        char uppercaseletter = scanner.next().charAt(0); // for index 0

        // input check //
        if (uppercaseletter >= 'A' && uppercaseletter <= 'Z'){
            char lowercaseletter = Character.toLowerCase(uppercaseletter);

            System.out.println("The lowercase letter is: "+ lowercaseletter);
        } else {
            System.out.println("Please enter a valid uppercase letter.");
        }

        scanner.close();

    }
}
```

Output if the letter is uppercase:

```
run:
Enter an uppercase letter: P
The lowercase letter is: p
BUILD SUCCESSFUL (total time: 5 seconds)
```

Output if the letter is lowercase:

```
run:
Enter an uppercase letter: a
Please enter a valid uppercase letter.
BUILD SUCCESSFUL (total time: 11 seconds)
```

5. Write a program that receives an ASCII code (an integer between 0 and 128) and displays its character. For example, if the user enters 97, the program displays character 'a'.
   Source code:

```
import java.util.Scanner;
public class Question5 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 5 */
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter an ASCII code (0 to 128): ");
        int code = scanner.nextInt();

        // Check if code is in valid ASCII range
        if (code >= 0 && code <= 128) {
            char character = (char) code; // Convert integer to character
            System.out.println("The character for ASCII code " + code + " is: " + character);
        } else {
            System.out.println("Invalid input! Please enter a number between 0 and 128.");
        }

        scanner.close();

    }

}
```

   Output if the input number is between 0 to 128:

```
run:
Enter an ASCII code (0 to 128): 97
The character for ASCII code 97 is: a
BUILD SUCCESSFUL (total time: 5 seconds)
```

   Output if the input is more than 128:

```
run:
Enter an ASCII code (0 to 128): 140
Invalid input! Please enter a number between 0 and 128.
BUILD SUCCESSFUL (total time: 6 seconds)
```

6. Write a program that prompts the user to enter the month and year, and displays the number of days in the month. For example, January is 31 days, February is 28 days, March is 31 and etc.
   Source code:

```java
import java.util.Scanner;
public class Question6 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 6 */
        Scanner scanner = new Scanner(System.in);

        // ask user input
        System.out.print("Enter month: ");
        int month = scanner.nextInt(); // read month input as an integer

        System.out.print("Enter year: ");
        int year = scanner.nextInt();

        int days = 0; // variable to store number of days

        switch (month){ // switch statement to checks which month was entered
            case 1: case 3: case 5: case 7: case 8: case 10: case 12:
                days = 31;
                break;
            case 4: case 6: case 9: case 11:
                days = 30;
                break;
            case 2:
                if((year % 400 == 0)|| (year % 4 == 0 && year % 10 !=0)){
                    days = 29; //leap year checking
                } else {
                    days = 28; // normal year
                }
                break;
            default:  // runs if user entered a numnber outside 1 -12
                System.out.println("Invalid month entered");
                System.exit(0);
        }

        System.out.println("Number of days: " + days);
        scanner.close();
    }
}
```

Output if the month input iis between 1 to 12 :

```
run:
Enter month (1-12): 12
Enter year: 2000
Number of days: 31
BUILD SUCCESSFUL (total time: 8 seconds)
```

Output if the month is out of 1 to 12:

```
run:
Enter month (1-12): 13
Enter year: 2000
Invalid month entered
BUILD SUCCESSFUL (total time: 1 minute 0 seconds)
```

7. Write a program that prompts the user to enter assignment marks and displays the grade of the keyed in marks. The grading table is as follows:

Marks	**Grade**	**Description**
0-40	F	Fail
40-49	F+	Marginal Fail
50-54	D	Pass

55-64	C	
65-69	B	Credit
70-74	B+	
75-79	A	Distinction
80-100	A+	

Source code:

```
import java.util.Scanner;
public class Question7 {
    public static void main(String[] args){
       /* LAB 2 QUESTION 7 */
       Scanner scanner = new Scanner(System.in);

       // takes input from user
       System.out.print("Enter Assignment Marks: ");
       int marks = scanner.nextInt();

       String grade="0",desc="0";
       if (marks < 0 || marks > 100){
           System.out.println("Invalid marks");
       } else {
           if (marks >= 0 && marks <= 40){
               grade = "F";
               desc = "Fail";
           } else if (marks >= 40 && marks <= 49){
               grade = "F+";
               desc = "Marginal Fail";
           } else if (marks >= 50 && marks <= 54){
               grade = "D";
               desc = "Pass";
           } else if (marks >= 55 && marks <= 64){
               grade = "C";
               desc = "Pass";
           } else if (marks >= 65 && marks <= 69){
               grade = "B";
               desc = "Credit";
           } else if (marks >= 70 && marks <= 74){
               grade = "B+";
               desc = "Credit";
           } else if (marks >= 75 && marks <= 79){
               grade = "A";
               desc = "Distinction";
           } else if (marks >= 80 && marks <= 100){
               grade = "A+";
               desc = "Distinction";
           }
       }
       System.out.println("Grade: " + grade);
       System.out.println("Description: " + desc);
       scanner.close();


    }

}
```

Output if the marks is between 0-100:

```
run:
Enter Assignment Marks: 50
Grade: D
Description: Pass
BUILD SUCCESSFUL (total time: 5 seconds)
```

Output if the marks is out of 0-100:

```
run:
Enter Assignment Marks: 209
Invalid marks
Grade: 0
Description: 0BUILD SUCCESSFUL (total time: 12 seconds)
```

8. Write a program that sum up all the values in double typed of an array. The array capacity is 100. You are required to use for-each construct (enhanced for).
Source code:

```
import java.util.Scanner;
public class Question8 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 8 */
        double[] num = new double[100]; // create array that hold 100 values
        double sum = 0;
        for (int i = 0; i < num.length; i++){
            num[i] = i + 1;
            sum += num[i];

        }
        //alternative way
        //double sum = 0;
        //for (double value : num){ // take each element in num and put in variable value
        //    sum += value;
        //}
        System.out.println("The sum of all array values: " + sum);
    }
}
```

Output:

```
run:
The sum of all array values: 5050.0
BUILD SUCCESSFUL (total time: 0 seconds)
```

9. Suppose that the tuition of a university is RM10000 this year and this tuition fee increases 5% every year. Write a program that uses a loop to compute the tuition in ten years.
Source code:

```
import java.util.Scanner;
public class Question9 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 9 */
        double fee = 10000;
        double rate = 0.05;

        for (int year = 1; year <= 10; year++){
            fee = fee + (rate * fee);
        }

        System.out.printf("The tuition after 10 years is RM%.2f", fee);

    }

}
```

Output:

```
run:
The tuition after 10 years is RM16288.95
```

10. Use do-while construct, write a program that prompts the users to continue the program execution. “Yes” to continue the program and “No” to terminate the program.
Source code:

```java
import java.util.Scanner;
public class Question10 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 10 */
        Scanner scanner = new Scanner(System.in);
        String input;

        do{
            System.out.print("Hi! Do you want to continue the program execution? (Yes/No):");
            input = scanner.nextLine(); // read user input
        } while (input.equalsIgnoreCase("Yes")); // makes comparison case sensitive "yes", "YE

        System.out.println("Program terminated");
        scanner.close();

    }

}
```

Output if the input is no:

```
run:
Hi! Do you want to continue the program execution? (Yes/No):yes
Hi! Do you want to continue the program execution? (Yes/No):Yes
Hi! Do you want to continue the program execution? (Yes/No):YES
Hi! Do you want to continue the program execution? (Yes/No):No
Program terminated
BUILD SUCCESSFUL (total time: 1 minute 17 seconds)
```

11. Write a program that reads in investment amount, annual interest rate, and number of years, and displays the future investment value using the following formula.
futureInvestmentVal = investmentAmount x $(1 + \text{monthlyInterestRate})^{\text{numberOfYears}*12}$
Source code:

```java
import java.util.Scanner;
public class Question11 {
    public static void main(String[] args){
        /* LAB 2 QUESTION 11 */
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter investment amount: ");
        double investAmount = scanner.nextDouble();

        System.out.print("Enter annual interest rate: ");
        double annualInterestrate = scanner.nextDouble();

        System.out.print("Enter number of years: ");
        int year = scanner.nextInt();

        double monthlyInterestRate = annualInterestrate / 100 / 12;
        double futureInvestmentValue = investAmount * Math.pow(1 + monthlyInterestRate, year * 12);
        System.out.printf("Future investmen value is %.2f", futureInvestmentValue);
    }

}
```

Output:

```
run:
Enter investment amount: 120
Enter annual interest rate: 3
Enter number of years: 5
Future investmen value is 139.39
```