LAB 02

Good practices of programming

OBJECTIVE

Implementing good code practices and code optimization techniques.

Task 1:

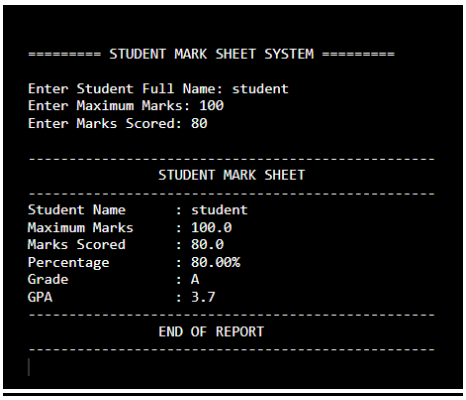
1. Create a design for the mark sheet by taking runtime value of student name, total marks, obtained marks and calculate its percentage, grade and GPA. Use good practices of programming that we have studied and ensure that the outcomes should be presented in a proper Viewable approach.

CODE :

```java
import java.util.Scanner;

public class lab02 {

    public static void main(String[] args) {
        // STUDENT MARK SHEET PROGRAM
        Scanner input = new Scanner(System.in);

        System.out.println("======== STUDENT MARK SHEET SYSTEM ========\n");

        System.out.print("Enter Student Full Name: ");
        String studentName = input.nextLine();

        System.out.print("Enter Maximum Marks: ");
        double maxMarks = input.nextDouble();

        System.out.print("Enter Marks Scored: ");
        double marksScored = input.nextDouble();

        double percent = (marksScored / maxMarks) * 100;
        String grade = (percent >= 90) ? "A+" :
                       (percent >= 80) ? "A" :
                       (percent >= 70) ? "B" :
                       (percent >= 60) ? "C" :
                       (percent >= 50) ? "D" : "F";

```

```
        double gpa = (percent >= 90) ? 4.0 :
                     (percent >= 80) ? 3.7 :
                     (percent >= 70) ? 3.0 :
                     (percent >= 60) ? 2.0 :
                     (percent >= 50) ? 1.0 : 0.0;

        System.out.println("\n-----------------------------------------");
        System.out.println("               STUDENT MARK SHEET");
        System.out.println("-----------------------------------------");
        System.out.println("Student Name   : " + studentName);
        System.out.println("Maximum Marks  : " + maxMarks);
        System.out.println("Marks Scored   : " + marksScored);
        System.out.printf("Percentage     : %.2f%%\n", percent);
        System.out.println("Grade          : " + grade);
        System.out.printf("GPA            : %.1f\n", gpa);
        System.out.println("-----------------------------------------");
        System.out.println("             END OF REPORT");
        System.out.println("-----------------------------------------");

        input.close();
    }
}
```

OUTPUT :



TASK 02 :

1. Create a class Rectangle with attributes length and width, each of which defaults to 1. Provide methods that calculate the rectangle's perimeter and area. It has set and get methods for both length and width. The set methods should verify that length and width are each floating-point numbers larger than 0.0 and less than 20.0. Write a program to test class Rectangle.

```java
import java.util.Scanner;

class Rectangle {
    private double length;
    private double width;

    public Rectangle() {
        length = 1.0;
        width = 1.0;
    }

    public void setLength(double l) {
        if (l > 0.0 && l < 20.0) {
            length = l;
        } else {
            System.out.println("Invalid length! Must be between 0.0 and 20.0");
        }
    }

    public void setWidth(double w) {
        if (w > 0.0 && w < 20.0) {
            width = w;
        } else {
            System.out.println("Invalid width! Must be between 0.0 and 20.0");
        }
    }

    public double getLength() {
        return length;
    }

    public double getWidth() {
        return width;
    }
```

```java
    public double getArea() {
        return length * width;
    }

    public double getPerimeter() {
        return 2 * (length + width);
    }
}

public class lab02 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        Rectangle rect = new Rectangle();

        // Input length
        System.out.print("Enter the length (between 0.0 and 20.0): ");
        double l = sc.nextDouble();
        rect.setLength(l);

        // Input width
        System.out.print("Enter the width (between 0.0 and 20.0): ");
        double w = sc.nextDouble();
        rect.setWidth(w);

        // Display results
        System.out.println("\n--- Rectangle Details ---");
        System.out.println("Length = " + rect.getLength());
        System.out.println("Width = " + rect.getWidth());
        System.out.println("Perimeter = " + rect.getPerimeter());
        System.out.println("Area = " + rect.getArea());

        sc.close();
    }
}
```

OUTPUT

```
Enter the length (between 0.0 and 20.0): 5
Enter the width (between 0.0 and 20.0): 12

--- Rectangle Details ---
Length = 5.0
Width = 12.0
Perimeter = 34.0
Area = 60.0
```