Assignment - 3

Object-Oriented Programming in Java

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Problem 1: Grading System – else if

Task: Write a program that takes a student's percentage as input and assigns a grade based on the following criteria:

- 90% and above → Grade A
- 80% to 89% → Grade B
- 70% to 79% → Grade C
- 60% to 69% → Grade D
- Below 60% → Grade F

Code:

```
import java.util.Scanner;
class PercentageElseIf{
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        // taking percentage from the end user
        System.out.print("Enter your percentage: ");

        // check if input is numeric
        if (!scanner.hasNextDouble()){
            System.out.println("Invalid Input: Enter a number
               between 0 to 100");
            return;
        }

        double percentage = scanner.nextDouble();

        // validate percentage range
        if (percentage < 0 || percentage > 100) {
```

```
18              System.out.println("Invalid Percentage! Please enter
                    a value between 0 and 100");
19              return;
20          }
21
22          int grade = (int) (percentage / 10);
23
24          if (grade >= 9 && grade <= 10)
25              System.out.println("Grade: A");
26          else if (grade >= 8 && grade < 9)
27              System.out.println("Grade: B");
28          else if (grade >= 7 && grade < 8)
29              System.out.println("Grade: C");
30          else if (grade >= 6 && grade < 7)
31              System.out.println("Grade: D");
32          else
33              System.out.println("Grdae: F");
34      }
35  }
```

Output: —

```
V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>javac PercentageElseIf.java

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java PercentageElseIf
Enter your percentage: 80
Grade: B

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java PercentageElseIf
Enter your percentage: eighty
Invalid Input: Enter a number between 0 to 100

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>
```

Problem 2: Grading System – switch case

Task: Write a program that takes a student's percentage as input and assigns a grade based on the following criteria:

- 90% and above → Grade A
- 80% to 89% → Grade B
- 70% to 79% → Grade C
- 60% to 69% → Grade D
- Below 60% → Grade F

Code: —

```
1  import java.util.Scanner;
2  class GradingSwitch {
3      public static void main(String[] args) {
```

```
4           Scanner scanner = new Scanner(System.in);
5
6           System.out.print("Enter your percentage: ");
7
8           // check if input is numeric
9           if (!scanner.hasNextDouble()) {
10              System.out.println("Invalid Input: Please enter the
                    values between 0 to 100");
11              return;
12          }
13
14          double percentage = scanner.nextDouble();
15
16          // validate percentage range
17          if (percentage < 0 || percentage > 100){
18              System.out.println("Invalid Percentage");
19              return;
20          }
21
22          int grade = (int) (percentage / 10);
23
24          switch (grade){
25          case 10:
26          case 9: System.out.println("Grade: A"); break;
27          case 8: System.out.println("Grade: B"); break;
28          case 7: System.out.println("Grade: C"); break;
29          case 6: System.out.println("Grade: D"); break;
30          default:
31              System.out.println("Grade: F");
32              break;
33          }
34      }
35  }
```

Output: —

```
V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>javac GradingSwitch.java

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java GradingSwitch
Enter your percentage: 99
Grade: A

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java GradingSwitch
Enter your percentage: ninety nine
Invalid Input: Please enter the values between 0 to 100

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java GradingSwitch
Enter your percentage: 143
Invalid Percentage

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java GradingSwitch
Enter your percentage: 25
Grade: F
```

Problem 3: Electricity Bill Calculation – else if

Task: Write a program that calculates the electricity bill based on the number of units consumed. The charges per unit are as follows:

1. For the first 100 units: 5 per unit
2. For 101–200 units: 6 per unit
3. For 201–300 units: 7 per unit
4. For above 300 units: 8 per unit

Code:

```java
import java.util.Scanner;
class ElectrcityBillCalculationElseIf {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the Electricity consumed units: ");
        // check if input
        if (!scanner.hasNextDouble()) {
            System.out.println("Invalid Input");
            return;
        }

        double units = scanner.nextDouble();

        // validate the range
        if (units <= 0){
            System.out.println("Please enter the units greater than 0");
            return;
        }

        double amount;

        if (units <= 100) {
            amount = units * 5;
        }
        else if (units > 100 && units <= 200) {
            amount = (100 * 5) + ((units - 100) * 6);
        }
        else if (units > 200 && units <= 300) {
            amount = (100 * 5) + (100 * 6) + ((units - 200) * 7);
        }
        else {
            amount = (100 * 5) + (100 * 6) + (100 * 7) + ((units - 300) * 8);
        }
        System.out.println("Electricity Bill Amount: " + amount);
    }
```

```
}
```

Output: —

```
V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>javac ElectrictyBillCalculationElseIf.java

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationElseIf
Enter the Electricity consumed units: -8
Please enter the units greater than 0

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationElseIf
Enter the Electricity consumed units: eight
Invalid Input

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationElseIf
Enter the Electricity consumed units: 256
Electricity Bill Amount: 1492.0
```

Problem 4: Electricity Bill Calculation – switch case

Task: Write a program that calculates the electricity bill based on the number of units consumed. The charges per unit are as follows:

1. For the first 100 units: 5 per unit
2. For 101–200 units: 6 per unit
3. For 201–300 units: 7 per unit
4. For above 300 units: 8 per unit

Code: —

```java
import java.util.Scanner;
class ElectrcityBillCalculationSwitch {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the Electricity consumed units: "
           );
        // check if input
        if (!scanner.hasNextDouble()) {
            System.out.println("Invalid Input");
            return;
        }

        double units = scanner.nextDouble();

        // validate the range
        if (units <= 0){
            System.out.println("Please enter the units greater
               than 0");
            return;
        }

        int u = (int) (units / 100);

```

```
22          double amount;
23
24          switch (u) {
25          case 0: {
26              amount = units * 5;
27              break;
28          }
29          case 1: {
30              amount = (100 * 5) + ((units - 100) * 6);
31              break;
32          }
33          case 2: {
34              amount = (100 * 5) + (100 * 6) + ((units - 200) * 7);
35              break;
36          }
37          default: {
38              amount = (100 * 5) + (100 * 6) + (100 * 7) + ((units
                    - 300) * 8);
39          }
40          }
41          System.out.println("Electricity Bill Amount: " + amount);
42      }
43  }
```

Output: —

```
V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>javac ElectrcityBillCalculationSwitch.java

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationSwitch
Enter the Electricity consumed units: eight
Invalid Input

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationSwitch
Enter the Electricity consumed units: 0
Please enter the units greater than 0

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationSwitch
Enter the Electricity consumed units: 256
Electricity Bill Amount: 1492.0

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java ElectrcityBillCalculationSwitch
Enter the Electricity consumed units: 450
Electricity Bill Amount: 3000.0
```

Problem 5: Income Tax Calculation – else if

Task: Write a program that calculates the income tax payable based on the annual salary:

1. Income $\leq$ 2,50,000 : No tax
2. 2,50,001 – 5,00,000 : 5% tax
3. 5,00,001 – 10,00,000 : 20% tax
4. Above 10,00,000 : 30% tax

Code:

```java
import java.util.Scanner;
class IncomeTaxCalcElseIf {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter your Income: ");

        // check if input is numeric
        if (!scanner.hasNextDouble()){
            System.out.println("Invalid Input");
            return;
        }

        double income = scanner.nextDouble();

        // validate the range
        if (income <= 0) {
            System.out.println("Please enter Income greater than 0");
            return;
        }
        double tax;

        if (income <= 250000) {
            tax = 0;
        }
        else if (income > 250000 && income <= 500000) {
            tax = (income - 250000) * (5.0/100);
        }
        else if (income > 500000 && income <= 1000000) {
            tax = (250000 * (5.0/100)) + ((income - 500000) * (20.0/100)) ;
        }
        else {
            tax = (250000 * (5.0/100)) + (500000 * (20.0/100)) + ((income - 1000000) * (30.0/100));
        }
        System.out.println("The tax for income " + income + " is : " + tax);
    }
}
```

Output:

```
V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>javac IncomeTaxCalcElseIf.java

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java IncomeTaxCalcElseIf
Enter your Income: 500000
The tax for income 500000.0 is : 12500.0

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java IncomeTaxCalcElseIf
Enter your Income: 1000000
The tax for income 1000000.0 is : 112500.0
```

Problem 6: Income Tax Calculation – switch case

Task: Write a program that calculates the income tax payable based on the annual salary:

1. Income $\leq$ 2,50,000 : No tax
2. 2,50,001 – 5,00,000 : 5% tax
3. 5,00,001 – 10,00,000 : 20% tax
4. Above 10,00,000 : 30% tax

Code:

```java
import java.util.Scanner;
class IncomeTaxCalcSwitch {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter your Income: ");

        // check if input is numeric
        if (!scanner.hasNextDouble()){
            System.out.println("Invalid Input");
            return;
        }

        double income = scanner.nextDouble();

        // validate the range
        if (income <= 0) {
            System.out.println("Please enter Income greater than
                0");
            return;
        }
        double tax = 0.0;

        int slab;

        // decide slab index
        if (income <= 250000) {
            slab = 0;
        }
        else if (income <= 500000){
            slab = 1;
        }
        else if (income <= 1000000){
            slab = 2;
        }
        else {
            slab = 3;
        }

```

```
38          switch (slab) {
39          case 0: // upto 2.5L
40              tax = 0; break;
41          case 1: // upto 5L
42              tax = (income - 250000) * (5.0/100); break;
43          case 2: // upto 10L
44              tax = (250000 * (5.0/100)) + ((income - 500000) *
                    (20.0/100)) ;
45              break;
46          case 3: // above 10l
47              tax = (250000 * (5.0/100)) + (500000 * (20.0/100)) +
                    ((income - 1000000) * (30.0/100));
48              break;
49          default:
50              System.out.println("Error in Calculating Tax");
51          }
52          System.out.println("The tax for income " + income + " is
                : " + tax);
53      }
54  }
```

Output: —

```
V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>javac IncomeTaxCalcSwitch.java

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java IncomeTaxCalcSwitch
Enter your Income: 250000
The tax for income 250000.0 is : 0.0

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java IncomeTaxCalcSwitch
Enter your Income: 500000
The tax for income 500000.0 is : 12500.0

V:\CDAC\3_OOP_Java\1_Assignments\3_Assignment>java IncomeTaxCalcSwitch
Enter your Income: 1000000
The tax for income 1000000.0 is : 112500.0
```