Lab # 3
Selection Statements

Introduction:

Java provides three selection structures:

- if
- if….else
- Nested if
- switch

- If statement:
  A simple if statement executes on action if and only if the condition is true.
The syntax for a simple if statement is shown below:
if (Boolean expression){
    Statement(s)
}

- If….else statement:
  An if….else statement executes statements for the true case if the Boolean expression evaluates to true, otherwise, statements for the false case are executed. The syntax for a simple if…else statement is shown below:
if (Boolean expression){
    Statement(s) - for-the-true-case;
}
else {
    Statement(s) -for the-false-case;}

Note:

We use random() method in the Math class to generate random numbers. Invoking this method returns a random double value \( d \) such that \( 0.0 \leq d < 1.0 \). So \((\text{int})(\text{Math.random()} \times 10)\); this returns numbers between 0 and 9.

- **Nested if**

When you use if or if...else statement, you can write any statements to be executed in true or false cases including another if...else statement. The inner if is called nested if. Check the following code to see how it works.

```java
public static void main(String[] args) {
    int x = 10, y = 20, z = 30;
    if (z > x) {
        if (z > y) {
            System.out.println(z + " is larger than " + x + " and " + y);
        } else {
            System.out.println(z + " is larger than " + x + " but smaller than " + y);
        }
    }
}
```

Note: else clause is inside the first if so it is with the nested if and it is executed when \( z \) is less than or equal \( y \).
Note: else clause is for the outer if, so it is executed when z is less than or equal to x.

Switch statement:

Java provides a switch statement to handle multiple conditions efficiently.

```
switch (switch-expression){
    case value1: statement(s);
    break;
    case value2: statement(s);
    break;
    case valueN: statement(s);
    break;
    default: statement(s)- for- default;
}
```

- Once a case is matched, the statements starting from the matched case are executed until a break statement or the end of the switch statement is reached.
- **Conditional Operator (?:):**
  - Used in a place of an if....else statement. The syntax is:
  - Boolean expression? Expression1: expression2;

**Example:**
System.out.print(studentGrade>=60? "Passed": "Failed");

- **Programming Exercises:**

3.1-Write a program that reads three edges for a triangle and determines whether the input is valid. The input is valid if the sum of any two edges is greater than the third edge.

The Code:
```
import java.util.Scanner;

public static void main(String[] args)

    int edge1 = Integer.parseInt(input0);  // Enter first edge of a triangle
    int edge2 = Integer.parseInt(input1);  // Enter second edge of a triangle
    int edge3 = Integer.parseInt(input2);  // Enter third edge of a triangle

    if((edge1+edge2>edge3) && (edge1+edge3>edge2) && (edge2+edge3>edge1))
      JOptionPane.showMessageDialog(null, "Can edges "+edge1+","+edge2+" and "+edge3+
      form a triangle?true");
    else
      JOptionPane.showMessageDialog(null, "Can edges "+edge1+","+edge2+" and "+edge3+
      form a triangle?false");
```

The Output:
![Message Box](image)

3.4- Write a program that generates two integers under 100 and prompts the user to enter the addition of these two integers. The program then reports true if the answer is correct, false otherwise.

The Code:
3.8- Write a program that sorts three integers. The integers are entered from the input dialogs and sorted in variables num1, num2, and num3, respectively. The program sorts the numbers so that num1<=num2<=num3.

The Code:
Lab Work:

- Write a program that prompts the user to enter a number and check if it is even or odd number (even number is divisible by 2). If it is even check if it is divisible by 10 and if it is odd check if it is divisible by 5.
Using Switch:

The next short code generates a random number under 3, and checks it using switch statement. (Be careful when using break)

```java
public class SwitchUsing {
    public static void main(String[] args) {
        // The expected numbers are 0 or 1 or 2
        int number = (int) (Math.random() * 3);
        switch (number) {
            case 0: System.out.println("The number is 0");
                  break;
            case 1: System.out.println("The number is 1");
                  break;
            case 2: System.out.println("The number is 2");
                  break;
            default: System.out.println("The number is unknown");
        }
    }
}
```

Homework: 3. 2, 3.9, 3.12