JOBSHEET 7
LOOPING 2

1. Objective

- Students are able to understand the concept of nested loop
- Students are able to implement nested loop flowchart using Java programming language
- Students are able to explain nested loop writing format

2. Laboratory

2.1 Experiment 1: Loop Review

1. Experiment 1 was aimed at reviewing the loop that had been studied in the previous week. In experiment 1, a program will be made to make a view * N times sideways.
2. Create a new class, name it **Star**
3. Write the basic structure of the Java programming language which contains the **main()** function
4. Add the Scanner library
5. Make a **Scanner** declaration with the name **sc**
6. Add the following code to receive input from keyboard as the value to be stored in the variable N

```
System.out.print("Enter the value of N: ");
int N = sc.nextInt();
```

7. Add a for loop structure to display the * symbol according to the number specified via input

```
for (int i = 1; i <= N; i++) {
    System.out.print("*");
}
```

8. Compile and run the program. Observe the results!
9. Match the results of the running programs that you have created according to the following display

```
Enter the value of N: 5
*****
```

Questions!

1. If in **for** loop, the initialization **i = 1** is changed to **i = 0**, what is the result? How can It be like that?
2. If in **for** loop, condition **i <= N** is changed to **i > N**, what is the result? How can It be like that?
3. If in **for** loop, the condition for step **i++** is changed to **i--** what is the result? How can It be like that?

2.2 Experiment 2: Square Star

1. Experiment 2 is used to create a display * in the form of a square, with sides of a number of N. When observed further, this problem is actually similar to Experiment 1. In Experiment 1, for example the input of N is 5, then the resulting output is ***** (we can think of it as an inner loop showing 5 stars *****). For Experiment 2, doesn't the result of Experiment 1 just need to be repeated N times? (by adding an outer loop to repeat the inner loop process N times)
2. Create a new class, name it **Square**
3. Write the basic structure of the Java programming language which contains the **main()** function
4. Add the same program code as the contents of the **main()** function in Experiment 1

```
Scanner sc = new Scanner(System.in);
System.out.print("Enter the value of N: ");
int N = sc.nextInt();
for (int i = 1; i <= N; i++) {
    System.out.print("*");
}
```

5. Run the program. Make sure the results given are the same as in Experiment 1
6. Pay attention to the iterative syntax used to print * N times sideways. In step 4, we make **for** loop structure (red box) as an **inner loop**

7. Furthermore, the inner loop needs to be repeated N times in order to display the * symbol to form a square. Thus, it is necessary to add an **outer loop**

```
for (int iOuter = 1; iOuter <= N; iOuter++) {
    for (int i = 1; i <= N; i++) {
        System.out.print("*");
    }
    System.out.println("");
}
```

8. Compile and run the program. Observe the results!
9. Match the results of the running programs that you have created according to the following display

```
Enter the value of N: 5
*****
*****
*****
*****
*****
```

Questions!

1. Pay attention to outer loop. If in **for** syntax, the initialization **iOuter = 1** is changed to **iOuter = 0**, what is the result? How can it be like that?
2. Return the program to normal with initialization **iOuter = 1**. Then pay attention to the inner loop. If in **for** syntax, the initialization **i = 1** is changed to **i = 0**, what is the result? How can it be like that?
3. What is the difference between outer loop and inner loop?
4. Why is it necessary to add the syntax **System.out.println();** under inner loop? What will happen if the syntax is omitted?

2.3 Experiment 3: Triangle Star

1. Experiment 3 is used to create a display * in the form of a right triangle with a height of N
2. Create a new class, name it **Triangle**

3. Write the basic structure of the Java programming language which contains the **main()** function
4. Add the Scanner library
5. Make a **Scanner** declaration with the name **sc**
6. Add the following code to receive input from keyboard as the value to be stored in the variable N

```
System.out.print("Enter the value of N: ");
int N = sc.nextInt();
```

7. Add a while loop structure to display the * symbol according to the number specified via input

```
int i = 0;
while (i <= N) {
    int j = 0;
    while (j < i) {
        System.out.print("*");
        j++;
    }
    i++;
}
```

8. Compile and run the program. Observe the results!

Questions!

1. Look at the results, is the output generated with a value of N = 5 in accordance with the following display?

```
*
**
***
****
*****
```

2. If not, which parts should be improved or added? Describe any parts that need to be improved or added!

2.4 Experiment 4: Guess the Number Quiz

1. Experiment 4 is used to create a quiz to guess a random computer set number
2. Create a new class, name it **Quiz**
3. Add Scanner and Random libraries outside the class

```
import java.util.Scanner;
import java.util.Random;
```

4. Write the basic structure of the Java programming language which contains the **main()** function
5. Make a **Scanner** declaration with the name **input** and **Random** declaration with the name **rand**

```
Scanner input = new Scanner(System.in);
Random rand = new Random();
```

6. Add the following code to create a do-while loop structure that is used to make a game of guessing numbers quiz. In inner loop, the loop is used to ask the user to enter a number as long as the number entered does not match the number determined by the computer randomly. While the outer loop is used to repeat the game by choosing a new random number

```
char menu = 'y';
do {
    int number = rand.nextInt(10) + 1;
    boolean success = false;
    do {
        System.out.print("Guess the number (1-10): ");
        int answer = input.nextInt();
        input.nextLine();
        success = (answer == number);
    } while (!success);
    System.out.print("Do you want to repeat the game (Y/N)");
    menu = input.next().charAt(0);
    input.nextLine();
} while (menu == 'Y' || menu == 'y');
```

Note: the **input.nextLine()** syntax in that snippet is used to ignore the new line character

7. Compile and run the program. Observe the results!

Questions!

1. Explain the program flow in Experiment 4!
2. What must be done to discontinue (not repeat) the game?
3. Modify the program above, so that it can display information about: input the guess value entered by the user, whether it is smaller or greater than the answer (number) randomly determined by the computer!

3. Assignments

1. Create a program to print a numeric triangle display as below based on the N input (minimum N value is 3). Example N = 5

```
    1
   12
  123
 1234
12345
```

2. Create a program to print the star triangle view shown below based on the N input (minimum N value is 5). Example N = 7

```
*******
******
*****
****
***
**
*
```

3. Create a program to print a square numeric display like the one below based on N input (minimum N value is 3). Example N = 3 and N = 5

```
            5 5 5 5 5
            5       5
3 3 3       5       5
3   3       5       5
3 3 3       5 5 5 5 5
```

4. Create a program to print a square numeric display like the one below based on N input (minimum N value is 5). Example N = 5

```
12345
54321
12345
54321
12345
```