JOBSHEET 10
Function part 1

1. Learning Outcome

After finishing this lesson, students must be able to:
1. Master the basic concept of function, function parameter, return value, and scope of variable.

2. Implement Java program to create function, as well as for function with parameter, without parameter, with return value, without return value, and to call the function.

2. Labs Activity

2.1 Experiment 1: Function Without Parameter

Time: 40 minutes

1. Create a new class and save it as **Gratitude_StudentIDNumber.java**.
2. Create a function named **sayThankyou()** in the class.

```java
4    public static void sayThankyou(){
5      System.out.println("Thank you for being the best teacher in the world.\n"+
6      "You inspired in me a love for learning and made me feel like I could ask you anything.");
7    }
```

3. Create **main()** function and call **sayThankyou()** function from main function..

```java
9     public static void main(String[] args) {
10        sayThankyou();
11    }
```

Question!
1. Does function with no parameter always have void datatype?
2. Is it possible for sentence "**Thank you for…..dst**" to be displayed, without using **sayThankyou()** function? Modify the program so that it displays the sentence without using function!
3. What are the benefits of using functions in a program?

2.2 Experiment 2: Function with Parameters

Time: 40 minutes

1. Create a new function named **sayAdditionalGreetings()** that has one parameter with String datatype, in class di dalam *class* **Gratitude_StudentIDNumber.java**!

```
9 ⌄      public static void sayAdditionalGreetings(String greeting){
10           System.out.println(greeting);
11       }
```

2. Call **sayAdditionalGreetings()** function from *main*().

```
13       public static void main(String[] args) {
14           sayThankyou();
15           String expression = "Thankyou...wish you all the best!!";
16           sayAdditionalGreetings(expression);
17       }
```

Question!

1. What is the use of a parameter in a function?
2. Is parameter similar to variable? Please explain!
3. In the Java programming language, is parameter only used for passing input data? What about output data?

2.3 Experiment 3: Function with Return Value

Time: 40 minutes

1. Create a new class and save it as **Greetings_StudentIDNumber.java**.

2. Create a new function to get the recipient of the greeting named **getGreetingRecipient()** that will get the name from the user input and will return the name. That is why this method has String datatype and also has return value.

```
6        public static String getGreetingRecipient() {
7            Scanner input = new Scanner(System.in);
8            System.out.print(s:"Input the name of people you want to greet : ");
9            String recipientName = input.nextLine();
10           input.close();
11           return recipientName;
12       }
```

3. Create **main()** function and call **getGreetingRecipient()** function from main!

```
14       public static void main(String[] args) {
15           String name = getGreetingRecipient();
16  💡       System.out.println("Thank you "+name+" May the force be with you!");
17       }
```

Question!

1. Explain when do we need to create a function that requires a return value?
2. Can a **System.out.println** statement be added inside a function with a return value? What is its impact?
3. Can a function without a return value be called inside the main function without being passed to a variable? Like in experiment 1? Explain!

2.4 Experiment 4: Calling Function from the Other Function

Time: 50 minutes

1. Create a new class and name it as **ExpressingGratitude_StudentIDNumber.java**. In this class, we will attempt to combine the functions that we have previously created in the **Gratitude** and **Greetings** classes.
2. Create **getGreetingRecipient()** function, that will return the recipient's name after getting the input from the user.

```
6   public static String getGreetingRecipient() {
7       Scanner input = new Scanner(System.in);
8       System.out.print(s:"Input the name of people you want to greet : ");
9       String recipientName = input.nextLine();
10      input.close();
11      return recipientName;
12  }
```

3. Create **sayThankyou()** function, in this function, get the recipient for the greeting by calling **getGreetingRecipient()** function. The recipient will be included in the thank you expression (sentence).

```
13  public static void sayThankyou(){
14      String name = getGreetingRecipient();
15      System.out.println("Thank you "+name+" for being the best teacher in the world.\n"+
16      "You inspired in me a love for learning and made me feel like I could ask you anything.");
17  }
```

4. Create **main()** function and call **sayThankyou()** function from there.

```
18  public static void main(String[] args) {
19      sayThankyou();
20  }
```

Question!

1. Based on experiment 4, which function will execute first? Please explain!
2. Which is the correct way to write a function inside a class? Above the main function or below the main function? Please explain!

3. Modify the above program by adding the function **sayAdditionalGreetings()** with a String input parameter. The **sayAdditionalGreetings()** function contains additional remarks or greetings that you want to convey to the greeting recipient.

2.5 Experiment 5: Variable Arguments (Varargs)

Time: 40 minutes

1. Create a new class and name it as **Experiment5_StudentIDNumber.java**.
2. Create **show()** function that has **void** datatype, and has 2 parameters with **String** dan **int** datatype

```
4    static void show (String str, int... a){
5        System.out.println("String: "+str);
6        System.out.println("Number of arguments/parameters: " + a.length);
7
8        for (int i : a) {
9            System.out.print(i + " ");
10       }
11       System.out.println();
12   }
```

3. Create **main** function and call **show()** function from there.

```
14   public static void main(String[] args) {
15       show(str:"Programming Fundaentals 2023", ...a:100, 200);
16       show(str:"Information Tehcnology", ...a:1, 2, 3, 4, 5);
17       show(str:"Informatics");
18   }
```

Question!

1. Explain why the parameter in experiment 5 is written as **int... a**!
2. Mention the example of varargs in implementing code to solve real-world problems! (at least 3)
3. Can we use two different data types for varargs in one function? Provide an example!

2.6 Experiment 6: Writing Code, with and without Function

Time: 50 minutes

1. Create a new class and name it as **Experiment6_StudentIDNumber.java**.
2. Create a program to calculate the area of rectangle and volume of cube, without using function!

```
13        public static void main(String[] args) {
14            Scanner input = new Scanner (System.in);
15            int p, l, t, L, vol;
16            System.out.print(s:"Input length = ");
17            p = input.nextInt();
18            System.out.print(s:"Input width = ");
19            l = input.nextInt();
20            System.out.print(s:"Input height = ");
21            t = input.nextInt();
22
23            L = p*l;
24            System.out.println("Area of the rectangle = " + L);
25            vol = p*l*t;
26            System.out.println("Volume of the rectangle = "+vol);
27        }
```

3. The above code, if we implement using function, there will be at least 3 functions: **calculateArea**, **calculateVolume** and **main** function.

```
5        static int calculateArea (int l, int w) {
6            int area = l*w;
7            return area;
8        }
9        static int calculateVolume (int l, int w, int h) {
10           int vol = calculateArea(l, w)*h;
11           return vol;
12       }
   Run | Debug
13       public static void main(String[] args) {
14           Scanner input = new Scanner (System.in);
15           int p, l, t, L, vol;
16           System.out.print(s:"Input length = ");
17           p = input.nextInt();
18           System.out.print(s:"Input width = ");
19           l = input.nextInt();
20           System.out.print(s:"Input height = ");
21           t = input.nextInt();
22
23           L = calculateArea(p, l);
24           System.out.println("Area of the rectangle = " + L);
25           vol = calculateVolume(t, p, l);
26           System.out.println("Volume of the rectangle = "+vol);
27       }
```

4. Run the program and write down the result you got!

Question!
1. Explain the execution steps for experiment 6 above!
2. What is the output of the program below, then explain the steps of the program!

```java
1  public class programKu {
2      public static void TampilHinggaKei(int i) {
3          for (int j = 1; j <= i; j++) {
4              System.out.print(j);
5          }
6      }
7
8      public static int Jumlah (int bil1, int bil2) {
9          return (bil1 + bil2);
10     }
11
12     public static void TampilJumlah (int bil1, int bil2) {
13         TampilHinggaKei(Jumlah(bil1, bil2));
14     }
15
16     public static void main (String[] args) {
17         int temp = Jumlah(1, 1);
18         TampilJumlah(temp, 5);
19     }
20 }
```

3. When do we need to create a function with and without parameters? When do we need to create a function with and without return value? Explain!

3. Assignment

Time: 100 minutes

1. Create a new class named **CubeStudentIDNumber** that has function to calculate area and volume!

2. Create a program to manage the weekly grades (there are 7 weeks) of 5 students. The data must be implemented using 2 dimensional array as follows:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Sari	20	19	25	20	10	0	10
Rina	30	30	40	10	15	20	25
Yani	5	0	20	25	10	5	45
Dwi	50	0	7	8	0	30	60
Lusi	15	10	16	15	10	10	5

Add functions to retrieve information from the above data with the following details:
    a. Function to input students' grade data.
    b. Function to display all student grades from the first week to the seventh week.

c. Function to find the week that has the highest grade from all students.

d. Function to find the student with the highest grade (also display the grade information for each week).

3. Modify assignment number 2 above by getting the user input to determine the number of students and the number of weeks!

Group Assignment

Implement the function into your group project. Don't forget, make sure the source code is pushed to your repository.