JOBSHEET 3

Variables, Data Types, Operators and Input-Output

1. Objective

- Students understand and explain Data Types in Java programming

- Students understand and explain variables in Java programming

- Students are able to explain input-output in Java programming

- Students are able to express and explain Sequences in Java programming

- Students understand and explain Operators in Java programming

2. Laboratory

2.1 Experiment 1: Use of Variables

Experiment time: 40 minutes

1. Open the Visual Studio Code

2. Create a new file, name it **ExampleVariabelIDNumber.java**

3. Write the basic structure of the Java programming language which contains the **main()** function

4. Write the code below in **public static void main (String args [])**

```java
String oneOfMyHobbies = "Playing futsal";
boolean isSmart = true;
char gender = 'M';
byte _age = 20;
double $gpa = 3.38, height = 1.68;
System.out.println(oneOfMyHobbies);
System.out.println("Are you smart ?" + isSmart);
System.out.println("Gender: "+gender);
System.out.println("My current age is "+ _age);
System.out.println(String.format("My GPA is %s and my height is %s meters", $gpa, height));
```

5. Run the program code that you have written, then observe the results

Questions!

1. Change the variable name so that the variable naming model is good and correct!

2. What is the function of %s in the statement below?

```java
System.out.println(String.format("My GPA is %s and my height is %s meters", $gpa, height));
```

Is there anything you can use instead of %s? Name and explain it!

2.2 Experiment 2: Use of Data Types

Experiment time: 40 minutes

1. Open the Visual Studio Code

2. Create a new file, name it **ExampleDataTypeIDNumber.java**

3. Write the basic structure of the Java programming language which contains the **main()** function

4. Write the code below in **public static void main (String args [])**

```java
char bloodGroup = 'A';
byte distance = (byte) 130;
short theNumberOfResidents = 1025;
float temperature = 60.50F;
double weight = 0.5467812345;
long balance = 150000000;
int number = 0x10;
System.out.println("Blood group\t\t: " + (byte) bloodGroup);
System.out.println("Distance\t\t: " + distance);
System.out.println("The number of residents\t: " + theNumberOfResidents);
System.out.println("Temperature\t\t: " + temperature);
System.out.println("Weight\t\t\t: " + (float) weight);
System.out.println("Balance\t\t\t: " + balance);
System.out.println("Number\t\t\t: " + number);
```

5. Run the program code that you have written, then observe the results

Questions!

1. Explain why the **bloodGroup** does not display an "A"!

2. Explain the meaning of **byte distance = (byte) 130**! Then, explain why the results change when displayed!

3. In the syntax **float temperature = 60.50F;** remove the letter **F**, then run again. What happened?

4. Why does the result change when displaying weight values?

5. Explain the meaning of initializing **0x10** on **number** variables! What does it do?

2.3 Experiment 3: Use of Operators

Experiment time: 40 minutes

1. Open the Visual Studio Code

2. Create a new file, name it **ExampleOperatorIDNumber.java**

3. Write the basic structure of the Java programming language which contains the **main()** function

4. Write the code below in **public static void main (String args [])**

```java
int x = 10;
System.out.println("Initial value of x = " + x);
System.out.println("x++ = " + x++);
System.out.println("After evaluation, x = " + x);
x = 10;
System.out.println("Initial value of x = " + x);
System.out.println("++x = " + ++x);
System.out.println("After evaluation, x = " + x);
int y = 12;
System.out.println(x > y || y == x && y <= x);
int z = x ^ y;
System.out.println("The result of x ^ y is " + z);
z %= 2;
System.out.println("The final result is " + z);
```

5. Run the program code that you have written, then observe the results

Questions!

1. Explain in your opinion what is the difference between **x++** and **++x**!

2. What is the result of **int z = x ^ y;** do the calculations manually (you can use a calculator)!

2.4 Experiment 4: Case Study

Experiment time: 30 minutes

Pay attention to the Case Study below!

Mr. Dani has a garage with a triangular shape. Mr. Dani plans to cement the ground floor of the garage so that it can be used to park motorbikes comfortably. Identify the input, output, and process to help Mr. Dani calculate the area of his garage, then implement it into the program code!

1. Identify input, output, and process

    Input: base, height

    Output: area

    Process:

    a. Input base, height

    b. Calculate area = 1/2 *base *height

   c. Output area

2. Identify the variables and data types used

Variables	Data Types
base	int
height	int
area	float

3. Implementation into program code

Program code:

1. Create a new file, name it **TriangleIDNumber.java**

2. Write the basic structure of the Java programming language which contains the **main()** function

3. Add the Scanner library at the top (outside) of the class

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

4. Create a Scanner declaration inside the **main()** function

```java
Scanner sc = new Scanner(System.in);
```

5. Create **int** variables for the **base** and **height**, then a **float** variable for the **area**.

```java
int base, height;
float area;
```

6. Write the command to input the base and height

```java
System.out.print(s:"Input base: ");
base=sc.nextInt();
System.out.print(s:"Input height: ");
height = sc.nextInt();
```

7. Write down the command to calculate the area of a triangle

```java
area = base * height / 2;
```

8. Display the contents of the **area** variable

```java
System.out.println("Area of the triangle: " + area);
```

9. Run the program code that you have written, then observe the results

Questions!

1. Explain why you have to declare Scanner in Experiment 4?

2. Explain the use of the program snippets below!

```
base=sc.nextInt();
```

```
height = sc.nextInt();
```

2.5 Experiment 5: Case Study

Experiment time: 30 minutes

Pay attention to the Case Study below!

Mrs. Dina is one of ABC bank customers who saved Rp. 5 million. The bank provides interest of 2% every year. Mrs. Dina saved for 5 years. How much interest and savings can you take now?

1. Identify input, output, and process

   Input: base, height

   Output: area

   Process:

   Input: initial savings amount, savings period

   Output: interest, final savings amount

   Other data: interest percentage = 0.02

   Process:

   a. Input the initial savings amount, savings period

   b. Calculate interest = savings period * interest percentage * initial savings amount

   c. Calculate the final savings amount = interest + initial savings amount

   d. Interest output and final savings amount

2. Identify variables and data types

Variables	Data types
init_sav_amount	int
sav_period	int
final_sav_amount	double
interest	double
interest_percent = 0.02	double

3. Implementation into program code

Program code:

1. Create a new file, name it **BankIDNumber.java**

2. Write the basic structure of the Java programming language which contains the **main()** function

3. Add the Scanner library at the top (outside) of the class

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

4. Create a Scanner declaration inside the **main()** function

```java
Scanner sc = new Scanner(System.in);
```

5. Create **int** variables for the **base** and **height**, then a **float** variable for the **area**.

6. Create **int** variables for the **init_sav_amount** and **sav_period**, then **double** variables for the **final_sav_amount**, **interest**, and **interest_percent** according to the identification of variables and data types that has been done previously.

```java
int init_sav_amount, sav_period;
double final_sav_amount, interest, interest_percent = 0.02;
```

7. Write the command to input the **init_sav_amount** and **sav_period**

```java
System.out.print(s:"Input your initial savings amount: ");
init_sav_amount = sc.nextInt();
System.out.print(s:"Input your savings period: ");
sav_period = sc.nextInt();
```

8. Write down the command to calculate **interest**

```java
interest = sav_period * interest_percent * init_sav_amount;
```

9. Write a command to calculate the **final_sav_amount**

```java
final_sav_amount = interest + init_sav_amount;
```

10. Display the value of the **interest** and **final_sav_amount** variables

```java
System.out.println("Interest: "+ interest);
System.out.println("Final savings amount: "+ final_sav_amount);
```

11. Run the program code that you have written, then observe the results

3. Assignment

1. Do assignments according to your group's final project topic!

    a. Identify input, output, processes based on the scope of each group's final project topic. The processes identified are limited to processes that use arithmetic operators.

    b. Identify variables and data types based on input, output, and process according to project topic based on 1a.

    c. Implement questions a and b into Java program code so that it becomes a program that utilizes variables, data types, data input, arithmetic processes to display the expected output.