# COMP2026 Problem Solving Using Object Oriented Programming

## Laboratory 2

## Part A Discovery Exercises

***Type your answers in XXXXXXXX_lab02.docx***

### Task 1: More about Reading Input

Run the given **`ReadingInput.java`** program. Enter your name and age to get the output. For example,

```
Enter your name: Chan Tai Man
Enter your age: 20

Hello Chan Tai Man!
You are 20 years old.
```

Modify the **`ReadingInput`** program, so that it read in the age first and then the name. The program becomes:

```
import java.util.Scanner;

public class ReadingInput {
    public static void main(String[] args) {
        new ReadingInput().runApp();
    }

    void runApp() {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter your age: ");
        int age = in.nextInt();
        System.out.print("Enter your name: ");
        String name = in.nextLine();

        System.out.println();
        System.out.println("Hello " + name + "!");
        System.out.println("You are " + age + " years old.");

        in.close();
    }
}
```

Run the **`ReadingInput.java`** program again. Enter your age and name to get the output. What happened? Why? How to fix it? (hints on slides)

## Task 2: If statements

In this task, the problems are provided without indentation, which is not a good practice, making it hard for others to read and understand the code. They were made on purpose to confuse you.

a) Determine the output for each of the following code fragment when x is 6 and y is 8.

i.

```
if( x < 7)
if( y > 7)
System.out.print("A");
else
System.out.print("B");
System.out.print("C");
```

Output: _____.

ii.

```
if( x < 7)
{
if( y > 7)
System.out.print("A");
}
else
{
System.out.print("B");
System.out.print("C");
}
```

Output: _____.

b) Given:

```
if( y == 10)
if( x == 5)
System.out.print("A");
else
System.out.print("B");
System.out.print("C");
System.out.print("D");
```

Modify the given code above to produce the output shown in each part of the problem. Make no changes other than inserting braces and changing the indentation of the code. [Note: It is possible that no modification is necessary for some of the parts.]

i. Assume that x = 5 and y = 10, the output "ACD" is produced.

ii. Assume that x = 5 and y = 10, the output "A" is produced.

iii. Assume that x = 5 and y = 11, the output "BCD" is produced.

c) Fix the error(s) in the following if statement. Hint: What will happen when y = 0?

```
if (x%y == 0)
    System.out.println("x is divisible by y");
}
else if(y == 0)
{
    System.out.println("No Solution.");
}
else{
    System.out.println("x is not divisible by y");
}
```

d) Fix the error(s) in the following if statement.

```
if (score > 60)
{
    System.out.println("C");
}
else if(score > 70)
{
    System.out.println("B");
}
else if(score > 80)
{
    System.out.println("A");
}
else
{
    System.out.println("F");
}
```

## Task 3: Short Circuit Evaluation (Shortcuts)

Java evaluates the **&&** and **||** operators using a strategy called short-circuit mode in which it evaluates the right operand only if it needs to do so.

For example, if x is 0, the right-hand operand of **&&** in

**`x != 0 && n / x == 0`**

is not evaluated at all because **`x != 0`** is **`false`**. The expression

**`false &&`** ***whatever***

is always **`false`**, the rest of the expression no longer matters.

Similarly, the right-hand operand of **||** in

**`true ||`** ***whatever***

is not evaluated at all because the expression is always **`true`**, the rest of the expression no longer matters.

Set the values of x, y and z in the following program to give the output “ABC”.

```
int x = ?;
int y = ?;
int z = ?;

if (x != 0 && y / x > 0) {
    System.out.print("A");
}
if (y - z != 1 && x * y * z == 0) {
    System.out.print("B");
}
if ( x + y == 3 || y / z < 0) {
    System.out.print("C");
}
```

## Task 4: Switch Statements

a) Rewrite the following code fragment using **switch** statement.

```
if(c == 'E' || c == 'e')
    countE++;
else if(c == 'A' || c == 'a')
    countA++;
else if(c == 'I' || c == 'i')
    countI++;
else
    System.out.println("Error—Not A, E, or I");
```

Answer:

b) Rewrite the following code fragment using if statement.

```
switch (x){
   case 101:
   case 105: System.out.println("Turn Left");
             break;
   case 121:
   case 176: System.out.println("Turn Right");
             break;
   default:
             System.out.println("Stop");
}
```

Answer:

# Part B Programming Exercises

## Task 1: Word Game

Write a program called **`WordGame`** that plays a word game with the user. The program should ask the user to enter the following:

- His or her name
- His or her age
- The name of a city
- The name of a college
- A profession
- A type of animal
- A pet's name

After the user has entered these items, the program should display the following story, inserting the user's input into the appropriate locations:

```
There once was a person named NAME who lived in CITY.
At the age of AGE, NAME went to college at COLLEGE.
NAME graduated and went to work as a(n) PROFESSION.
Then, NAME adopted a(n) ANIMAL named PETNAME.
They both lived happily ever after!
```

Sample output:

```
Enter your name: Sandy
Enter your age: 20
Enter the name of a city: Hong Kong
Enter the name of a college: HKBU
Enter a profession: Engineer
Enter a type of animal: fish
Enter a pet's name: Nemo

There once was a person named Sandy who lived in Hong Kong.
At the age of 20, Sandy went to college at HKBU.
Sandy graduated and went to work as a(n) Engineer.
Then, Sandy adopted a(n) fish named Nemo.
They both lived happily ever after!
```

## Task 2: Test Positive

You are given a program called **`TestPositive`** that determines whether an input integer is a positive value.

```
Enter an integer value: 100
The value is positive.
Good Bye !
```

Modify the program to make it also print outputs for negative and zero values.

Sample output 1:

```
Enter an integer value: 100
The value is positive.
Good Bye !
```

Sample output 2:

```
Enter an integer value: -50
The value is negative.
Good Bye !
```

Sample output 3:

```
Enter an integer value: 0
The value is zero.
Good Bye !
```

## Task 3: Finding Age

Write a program called **`Age`** that asks the user to enter the current date and a person's birth date in the form "**`year month day`**". The program then calculates the person's age in integral years.

Sample output 1:

```
Enter today's date: 2018 9 10
Enter a persion's birth date: 2000 1 1
The person's age is 18
```

Sample output 2:

```
Enter today's date: 2018 9 10
Enter a persion's birth date: 2000 9 30
The person's age is 17
```

## Task 4: Parking Charge

Write a program called **`ParkingCharge`** that reads in the types of vehicle (**`c`** for car, **`b`** for bus, **`t`** for truck) and the hours (integer) a vehicle spent in the parking lot and prints the parking charge based on the rates shown below.

| | |
|---|---|
| **Car** | $38 per hour |
| **Bus** | $56 per hour |
| **Truck** | $63 per hour |

Sample output:

```
Type of vehicle: t
Hours the vehicle spent: 5
Parking Charge: 315
```

## Task 5: Distance between two points

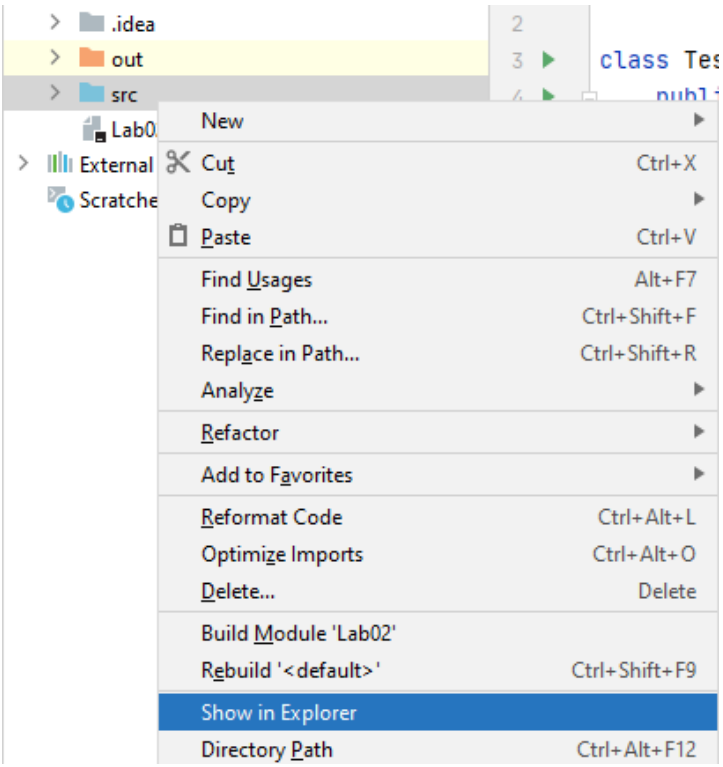
Write a program called **`DistanceOfTwoPoints`** that prompts the user to enter two points $(x_1, y_1)$ and $(x_2, y_2)$ and displays the Euclidean distance between them. Note that you can use **`Math.pow(a, 2)`** and **`Math.sqrt(a)`** to compute $a^2$ and $\sqrt{a}$ respectively. The formula to find the Euclidean distance is $distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ . Format the output to display the result with 2 decimal places.

Sample output:

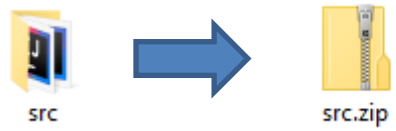
```
Enter x1 and y1: 1.5 -3.4
Enter x2 and y2: 4 5
The distance of the two points is 8.76
```

## Part C Submitting Exercises

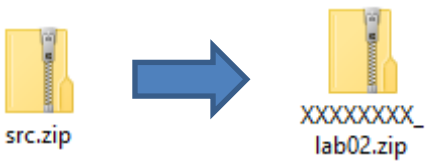
Step 1: Right-click the **src** folder and select **Show in Explorer**



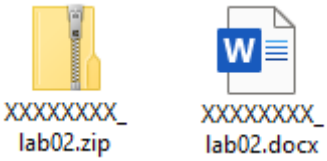

Step 2: Zip the **src** folder into **src.zip**




Step 3: Rename the src.zip file to ***XXXXXXXX_lab02.zip*** where ***XXXXXXXX*** is your **student id**




Step 4: Submit ***XXXXXXXX_lab02*.zip** and **XXXXXXXX_lab02.docx** to Moodle.



## References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