

LAB 2 – CONTROL STRUCTURES

Read the
problem/question
first.

Example 1:	AboutNumbers.java
Problem :	Write a program that inputs a number and prints whether the number is positive number, negative number or zero. Repeat the program for 5 numbers.
Solution: (the program uses for loop structure.)	
<pre>//Lab 2 eg1: AboutNumbers.java import java.util.Scanner; public class AboutNumbers { public static void main (String [] arg) { Scanner input = new Scanner(System.in); for(int j=0; j<5; j++) { System.out.println("Enter a number:"); double n = input.nextDouble(); if(n>0) System.out.println(n + " is a positive number"); else if(n<0) System.out.println(n + " is a negative number"); else System.out.println(n + " is a zero number"); } } }</pre> <p>The program uses for loop structure</p>	
Review: Compile-run and understand the question and program. Fix error (if any).	

Example 2:	WindStatus.java								
Problem :	<p>You are required to create a program that will display the status/category of wind speed, based on the status/category below.</p> <table border="1"> <thead> <tr> <th>Wind speed</th><th>Status / Category</th></tr> </thead> <tbody> <tr> <td>Below 38</td><td>Windy</td></tr> <tr> <td>39 to 54</td><td>Gale</td></tr> <tr> <td>Over 55</td><td>Storm</td></tr> </tbody> </table> <p>The user will be prompted to enter the speed. The program allows the user to continue or stop by entering <i>true</i> or <i>false</i>.</p>	Wind speed	Status / Category	Below 38	Windy	39 to 54	Gale	Over 55	Storm
Wind speed	Status / Category								
Below 38	Windy								
39 to 54	Gale								
Over 55	Storm								
<p>Solution : (the program uses do-while structure and boolean data type as the sentinel value to stop)</p> <pre>//Lab 2 eg2: WindStatus.java import java.util.Scanner; public class WindStatus { public static void main(String [] args) { Scanner input = new Scanner(System.in); String status = ""; boolean wish; do { System.out.print("\nEnter the wind speed = "); double wind = input.nextDouble(); if(wind <=38) status = "Windy"; else if(wind >=39 && wind <55) status = "Gale"; else if(wind >=55) status = "Storm"; System.out.println("It is " + status); System.out.println("Do you wish to continue?[true/false]"); wish = input.nextBoolean(); } while (wish); } }</pre>									
Review: Compile-run and understand the question and program. Fix error (if any).									

Read the problem/question first.

do-while structure and **Boolean** data type as the **sentinel value** to stop

Example 3:	CalculateArea.java
Problem :	<p>Write a program that user may select whether to calculate area of rectangle or an area of circle. Create a menu option such as:</p> <ol style="list-style-type: none"> 1. Calculate Area of Rectangle 2. Calculate Area of Circle 3. Exit Program <p>If the user selects Choice 1:</p> <ul style="list-style-type: none"> ▪ Ask the user to enter width and length. ▪ Calculate area. (area = width x length) ▪ Display the area. <p>If the user selects Choice 2:</p> <ul style="list-style-type: none"> ▪ Ask the user to enter radius. ▪ Calculate area. (area = PI x radius x radius). ▪ Display the area. <p>Stop the program if user selects 3. Else, display "Invalid input" and repeat the program.</p>
Solution: (the program uses while loop structure and switch-case for the selection)	
<pre>//Lab 2 eg3: CalculateArea.java import java.util.Scanner; public class CalculateArea { public static void main(String [] args) { Scanner input = new Scanner(System.in); double area = 0; System.out.println("\n MENU "); System.out.println("-----"); System.out.println(" 1. Calculate area of rectangle "); System.out.println(" 2. Calculate area of a circle "); System.out.println(" 3. Exit program "); System.out.println("-----"); System.out.print("Please enter you choice : "); int choice = input.nextInt();</pre>	

**Read the
problem/question
first.**

First input of
'choice' (outside
the loop).

while loop
structure
and
**switch-
case** for
the
selection

```
while(choice !=3)
{
    switch(choice)
    {
        case 1:
            System.out.print("Enter width : ");
            double width = input.nextDouble();
            System.out.print("Enter length : ");
            double length = input.nextDouble();
            area = width * length;
            System.out.printf("The area is : %.2f\n",area);
            break;

        case 2:
            System.out.print("Enter radius: ");
            double radius = input.nextDouble();
            area = Math.PI *Math.pow(radius,2);
            System.out.printf("The area is : %.2f\n",area);
            break;

        default: System.out.println("Invalid input");
    }//switch

    System.out.print("\nPlease enter your choice : ");
    choice = input.nextInt();
} //end while

System.out.println("\nProgram end.");
} //main
} //class
```

Second input
of 'choice'
(inside the
loop).

Review: Compile-run and understand the question and program. Fix error (if any).

LAB EXERCISE

Reminder:

Write the following info in your java file:

//Name and ID

//Group

//Lab x /Q x

QUESTION 1


Write a program that calculates an average of body mass index (BMI) of students in a class. The formula is: (weight is in pounds and height is in inches)

$$\text{BMI} = \frac{\text{weight} \times 703}{\text{height}^2}$$

- Prompt the user to **enter the number of students**
- Next, enter the student's weight and height. **Calculate** the BMI for each student and **sum up** the BMI for all students. Repeat this process for all students.
- Next, calculate the **average BMI** of the class.
- Then, the program should display the **BMI category** based on the **average BMI** as shown in the following table:

Average BMI	Category
Less than 18.5	Underweight
From 18.5 – less than 25	Normal
From 25.0 – less than 30	Overweight
From 30 and greater	Obese

Sample output:




```
run:
Enter a number of students = 4
Enter weight and height for student 1:
Weight (lbs) = 110.5
Height (in) = 59.7
Enter weight and height for student 2:
Weight (lbs) = 145
Height (in) = 70
Enter weight and height for student 3:
Weight (lbs) = 90.9
Height (in) = 55.3
Enter weight and height for student 4:
Weight (lbs) = 81
Height (in) = 65
Average BMI for this class is: 19.24
Majority the students of this class are: Normal
```

QUESTION 2

Modify Example 1:

- Add code to determine whether the number is prime.
- Sample output:



```
Enter a number:
67
67.0 is a positive number
67.0 is a prime number.
Enter a number:
-35
-35.0 is a negative number
-35.0 is a prime number.
Enter a number:
48
48.0 is a positive number
48.0 is not a prime number.
Enter a number:
12
12.0 is a positive number
12.0 is not a prime number.
Enter a number:
1
1.0 is a positive number
1.0 is a prime number.
```

QUESTION 3

Modify Example 2:

- User could enter "Yes" or "No" instead of `true` or `false`, whenever he/she wants to continue or stop.
- Prompt again the question to user if the input is other than "Yes/No".
- Note:
 - You may explore ***String*** class for string manipulations (such as converting uppercase to lowercase, etc.)
 - Find out on how to compare between strings.

[Hint: This code: `(wish=="Yes")` is **NOT CORRECT** for this situation]
- Sample output:

```
Enter the wind speed = 89
It is Storm
Do you wish to continue?[Yes/No]
YES

Enter the wind speed = 15
It is Windy
Do you wish to continue?[Yes/No]
ok
Do you wish to continue?[Yes/No]
yes

Enter the wind speed = 56
It is Storm
Do you wish to continue?[Yes/No]
stop
Do you wish to continue?[Yes/No]
no
```

QUESTION 4

Modify Example 3:

- Add **TWO (2)** more options to calculate area of two geometric shapes.
- Edit the output accordingly.