# Algorithms and Flowcharts

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## Exercise

✗ Write an algorithm and draw a flowchart that prints a double number of the inputted value.

# Relational/Comparison Operators

| Comparison Operators | |
|---|---|
| Operator | Description |
| > | Greater than |
| < | Less than |
| = | Equal to |
| $\geq$ | Greater than or equal to |
| $\leq$ | Less than or equal to |
| $\neq$ | Not equal to |

## Decision structures

✗ The expression A>B is a logical expression

✗ it describes a **condition** we want to test

✗ **if A>B is true (if A is greater than B)** we take the action on left

✗ print the value of A

✗ **if A>B is false (if A is not greater than B)** we take the action on right
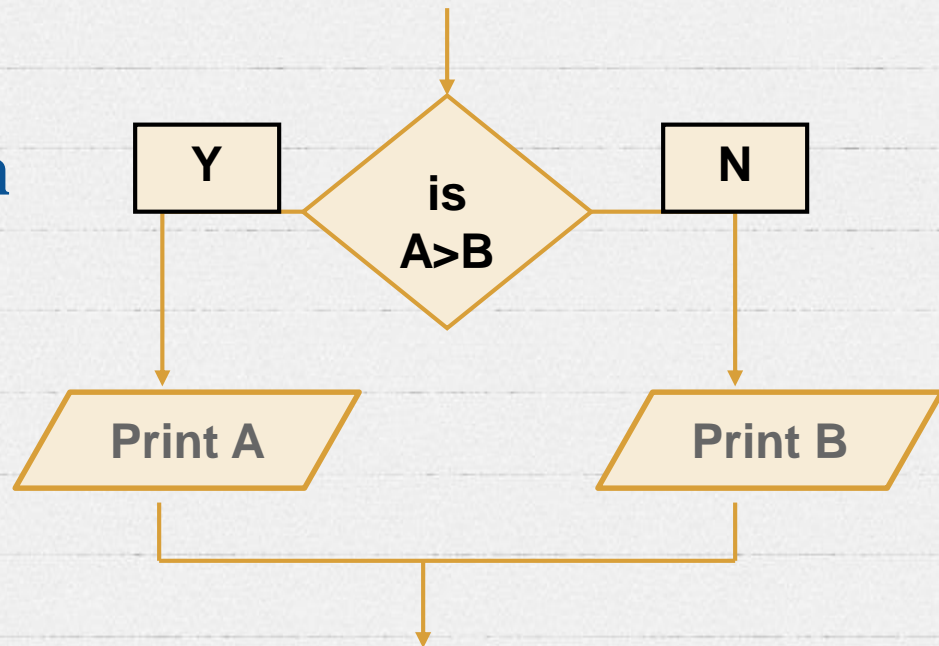
✗ print the value of B

# If–then–else structure

✗ The structure is as follows

        *If condition  then*

           *true alternative*

      *else*

           *false alternative*

      *endif*

# If–then–else Structure

✗ The algorithm for the flowchart is as follows:

**If A>B then**
  **print A**
**else**
  **print B**
**endif**

# Example 1

✗ Write an algorithm and draw a flowchart that reads two values, determines the largest value and prints the largest value with an identifying message.

# Example 1

- **Algorithm:-**

    Step 1: start
    Step 2:  Input VALUE1, VALUE2
    Step 3:   if (VALUE1 > VALUE2) then
                        MAX ← VALUE1
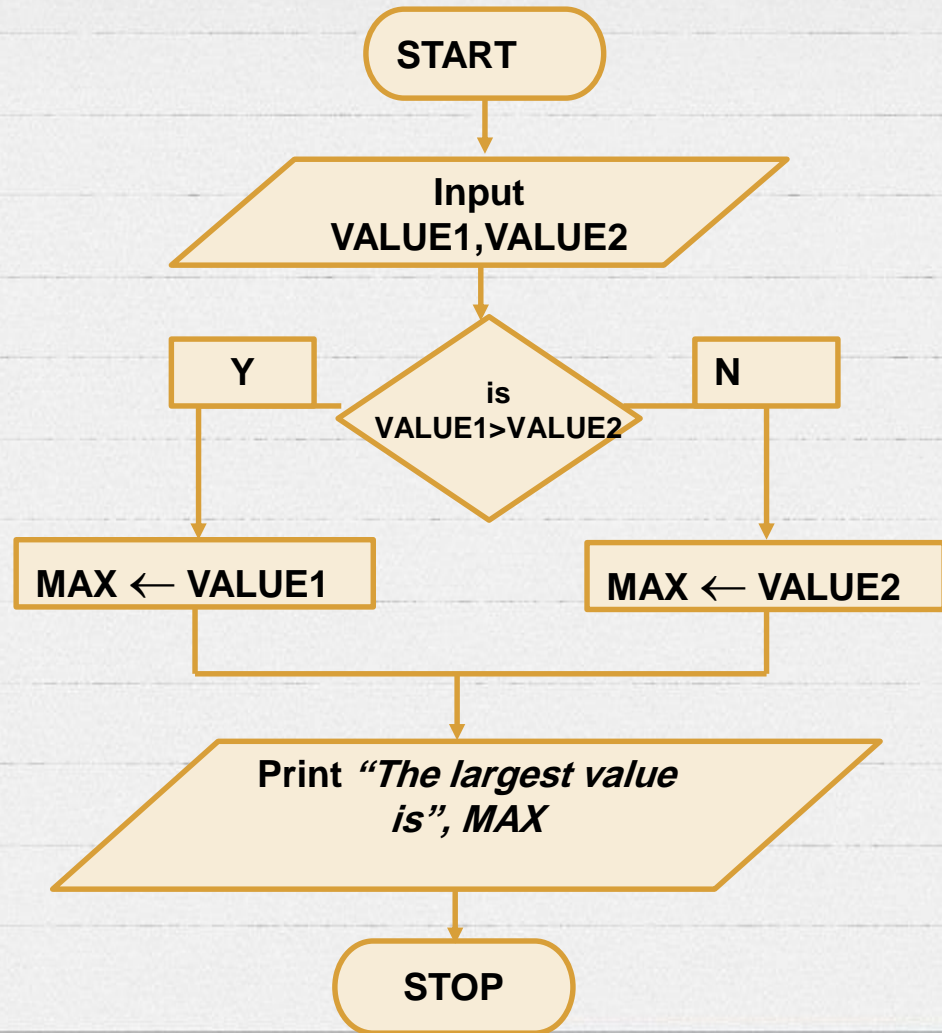            else
                        MAX ← VALUE2
                endif
    Step 4:  Print "The largest value is", MAX
    Step 5: end.

# Example 1

☐ **Flowchart:-**

## Example 2

✗ Write an algorithm and draw a flowchart to determine a student's final grade and indicate whether it is passing or failing.

✗ The final grade is calculated as the average of four marks.
if average is **below 50** Print "**FAIL**"
else Print "**PASS**"

# Example 2

❑ **Algorithm:-**

Step 1: Start
Step 2:   Input M1,M2,M3,M4
Step 3: Average← (M1+M2+M3+M4)/4
Step 4:   if (Average< 50) then

                Print "FAIL"
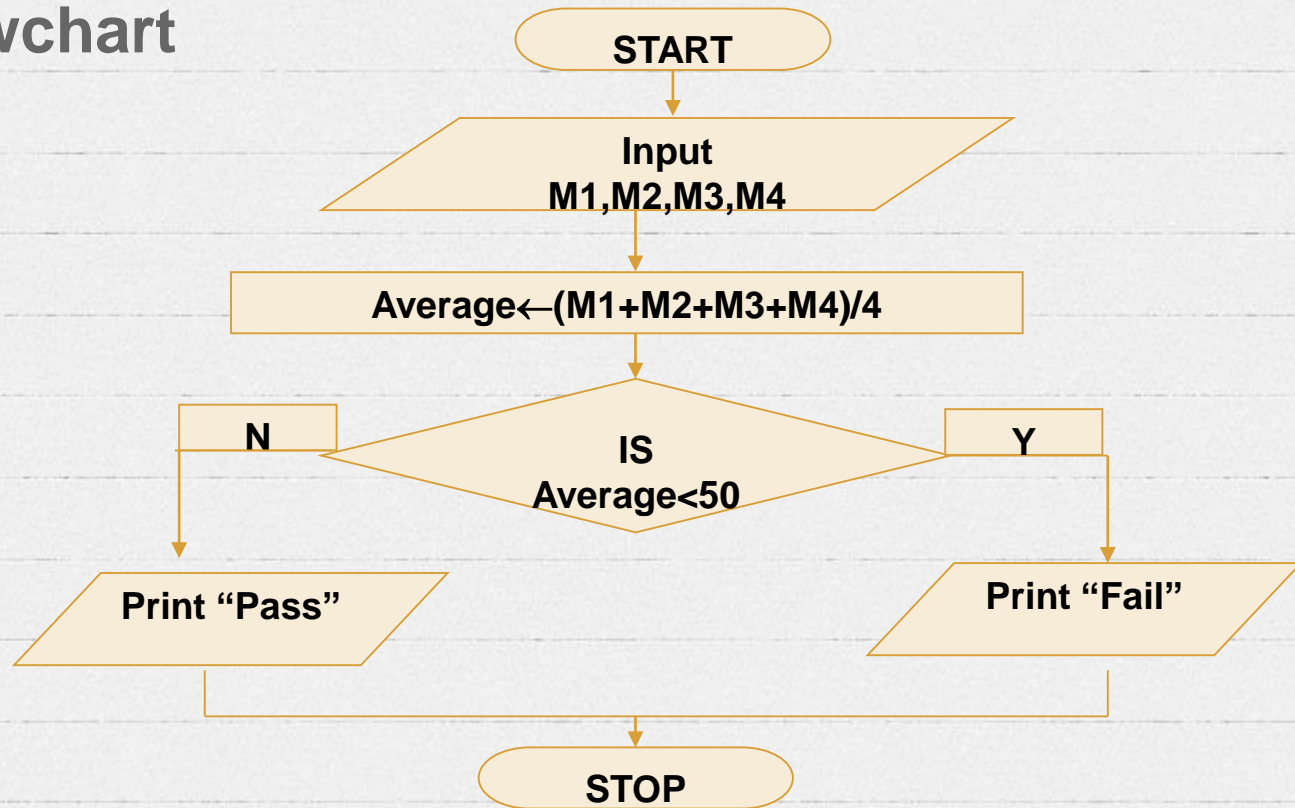          else

                Print "PASS"
          endif
Step 5: End.

# Example 2

❑ **Flowchart**

Loop
(Repetition)

# Loop (Repetition)

✗ The *loop* allows a statement or a sequence of statements to be repeatedly executed based on some loop condition.

✗ It is represented by the 'while' and 'for' constructs in most programming languages, for unbounded loops and bounded loops respectively.

✗ Unbounded loops refer to those whose number of iterations depends on the eventuality that the termination condition is satisfied; bounded loops refer to those whose number of iterations is known before-hand.

# Flowchart for a Loop
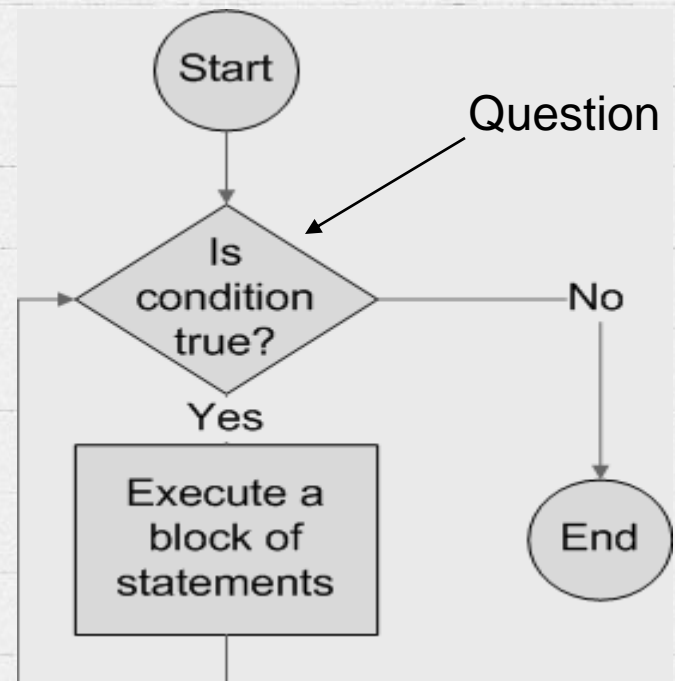
Loop or repetition structure flowchart:

Ask a question
> Answer is "Yes"
>> Execute the loop

> Answer is "NO"
>> Exit the loop

Question

# Loop (Repetition): **Examples**

χ   ***Problem1***: Write an algorithm and draw a flowchart to find the sum of numbers from 1 to 100

Step 1: Start
Step 2: i ← 1 and SUM ← 0
Step 3: **SUM ← SUM+ i**
Step 4: **i← i+ I**
Step 5: If (i <=100) then go to step 3
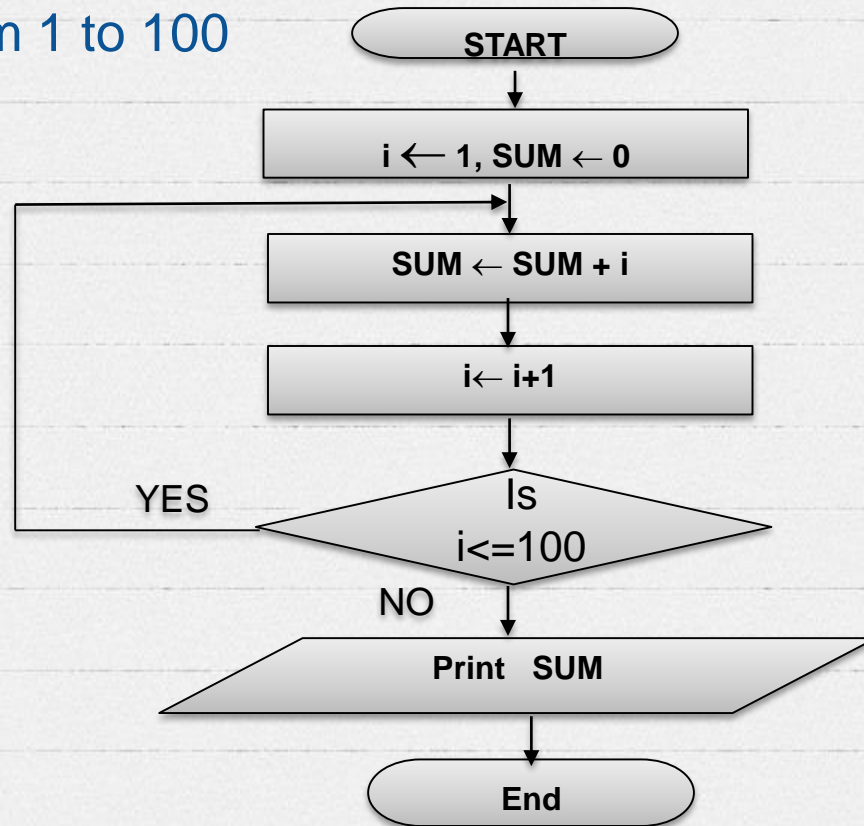          else
               print  SUM
Step 6: End

# Loop (Repetition): **Examples**

✗    ***Problem1***: Write an algorithm and draw a flowchart to find the sum of numbers from 1 to 100

**Flowchart**

START

i ← 1, SUM ← 0

SUM ← SUM + i

i← i+1

YES

Is i<=100

NO

Print   SUM

End

# Loop (Repetition): **Examples**

Χ   **Another Solution for problem 1**

Step 1: Start
Step 2: i ← 1 and SUM ← 0
Step 3 : If (i <=100) then
        **SUM ← SUM+ i**
        i ← i+1
        go to step 3
    else
        print  **SUM**
Step 4: End

# Loop (Repetition): **Examples**

✗ **Problem2**: Write an algorithm to print even numbers between 0 and 99
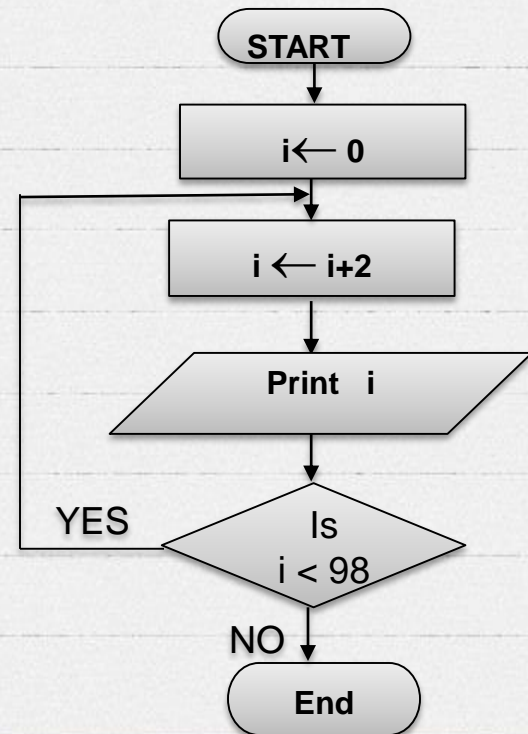
**Flowchart**

Step 1: Start

Step 2: i ← 0

Step 3: **i ← i+2**

Step 4**: Print  i**

Step 5: If (i <98) then go to

step 3

 Step 6: End

START

i← 0

i ← i+2

Print   i

YES          Is
            i < 98

NO

End

# Loop (Repetition): **Examples**

✗ *Another Solution for problem 2*

Step 1: Start
Step 2: i ← 0
Step 3: i ← i+1
Step 4: If (i <99) then
            if (i % 2=0)
               print  i
               go to step 3
           else
               go to step 3
Step 5: End

# Assignment 2

1) Write an algorithm and draw a flowchart to enter a number and displays whether the number is odd or even.

2) Write an algorithm and draw a flowchart to enter a number and displays Its absolute value

3) Write an algorithm and draw a flowchart to find average of n numbers

4) Write a an algorithm that print the following set of numbers:
0, 10, 20, 30, 40, 50,…..1000

Thanks!