

1. What is Algorithm? What is Flowchart? Write down the advantages and disadvantages. Compare them.

Purpose of Flowchart and Algorithm in Programming:

- Programming is nothing but describing the steps needed to be executed by the computer to solve any problem or task.
- Say for example we had all seen food recipes to prepare any food. Same like in our Computer Programming the word recipes will be replaced by the **procedure** and the ingredients are called **input/s**, computer will follow the procedure with the given input/s data and what we final achieved that is known as **output**.

Algorithm

- An algorithm is a step by step procedure for solving a problem in a finite number of steps.
- It is written in the natural languages like English.

➤ Advantages:

- Easy to write.
- To understand it, simple read the algorithm.
- It is not dependent on any programming languages.
- Every steps has its own logical meaning and then it follows the next step.
- Algorithms for big problems can be divided in to small parts.

➤ Disadvantages:

- Difficult to debug.
- Time Consuming
- Difficult to show branching and looping.
- Jumping (goto) makes it hard to trace some problems.

➤ Types of Algorithm:

1. Recursive Algorithm
2. Dynamic Programming Algorithm
3. Backtracking Algorithm
4. Divide and Conquer Algorithm
5. Greedy Algorithm
6. Brute force Algorithm
7. Randomized Algorithm

➤ Example:

Write **algorithm** to find out the area of circle.

Step 1: Start

Step 2: Initialize PI \leftarrow 3.14, area \leftarrow 0

Step 3: Read value of r

Step 4: Calculate area \leftarrow PI * r * r

Step 5: Print area

Step 6: Stop

Flowchart

- Flowchart is a pictorial or graphical representation of a process.
- Each step in the process is represented by a different symbol and contains a short description of the process step.
- The flow chart symbols are linked together with arrows showing the process flow direction.
- This pictorial representation can give step-by-step solution of the given problem.

➤ Advantages:

- Easy to draw.
- Easy to understand logic.
- Easy to identify mistakes by non-computer person.
- Easy to show branching and looping.

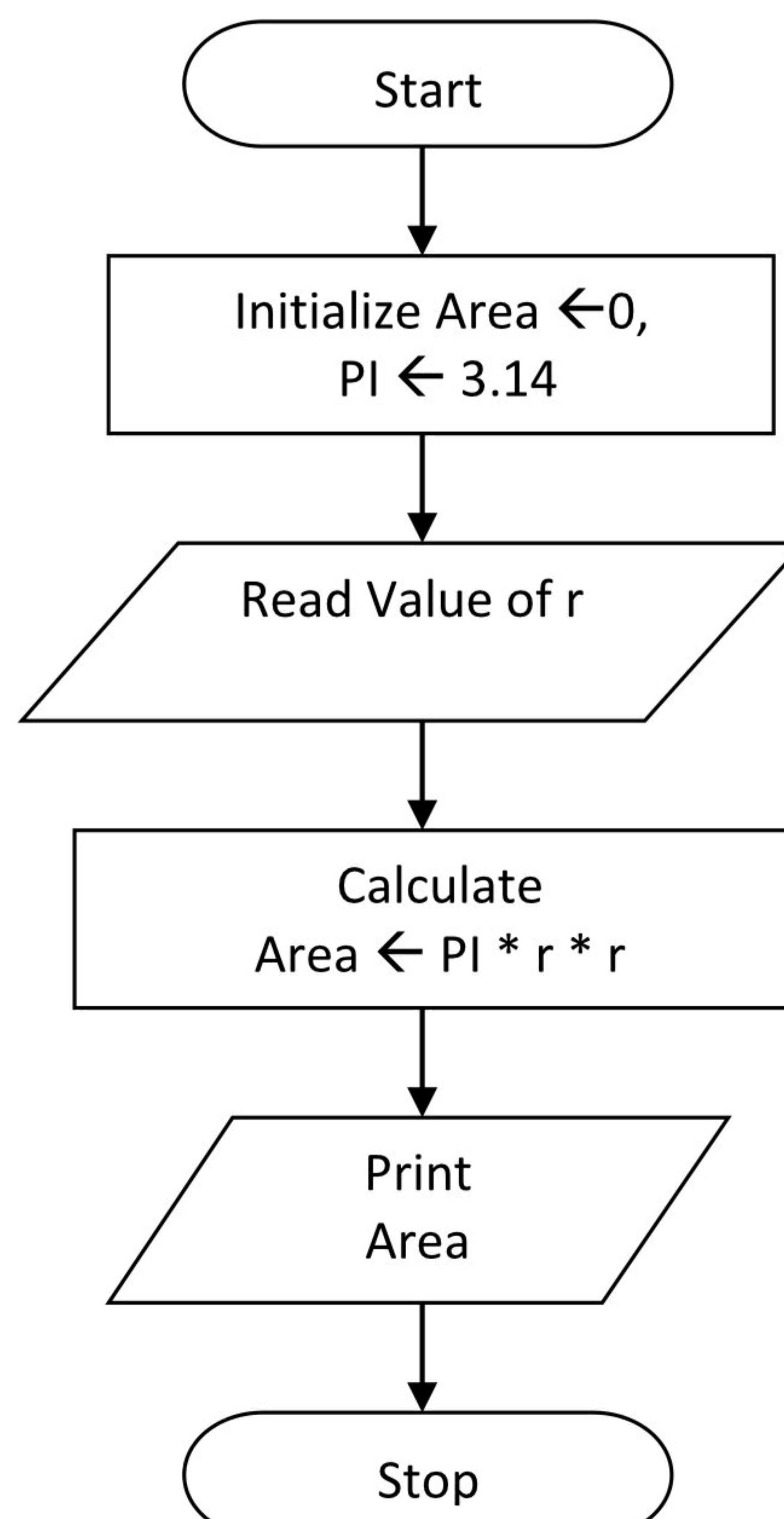
➤ Disadvantages:

- Time consuming.
- Difficult to modify.
- Very difficult to draw flowchart for big or complex problems.
- Have to use special symbol for each and every task.

➤ Characteristic of Flowchart:

1. Must use standardized Symbols
2. Symbols should be correct and as per the flowchart rules
3. Should contains clear, short and readable statements in symbols
4. Must be clear starting and ending point
5. Must contains clear arrows for conversion from one step to another step

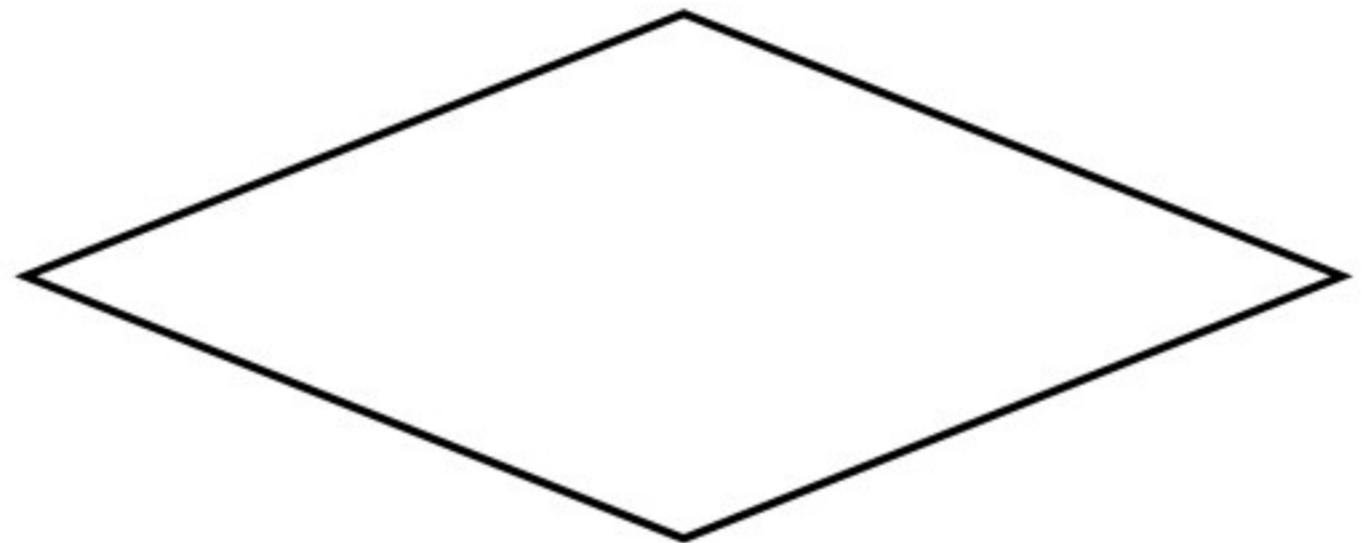
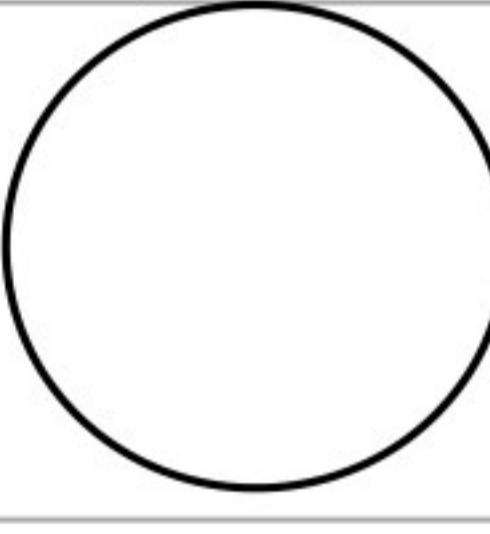
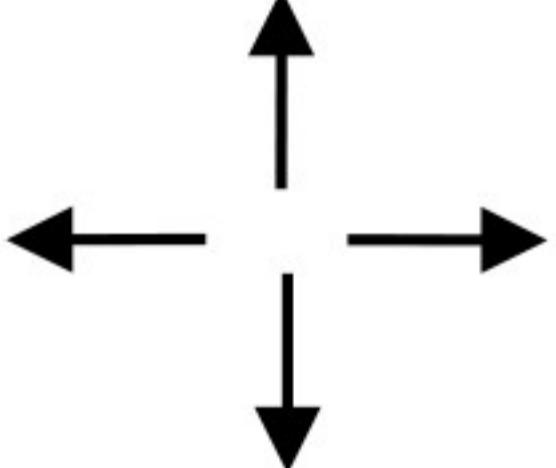
➤ Example:



Comparison:

Flowchart	Algorithm
It is a pictorial representation of a process.	It is step wise analysis of the work to be done.
Solution is shown in graphical format.	Solution is shown in non-computer language like English.
Easy to understand as compared to algorithm.	It is somewhat difficult to understand.
Easy to show branching and looping.	Difficult to show branching and looping.
Flowchart for big problem is impractical	Algorithm can be written for any problem

2. Explain various symbol used in flowchart.

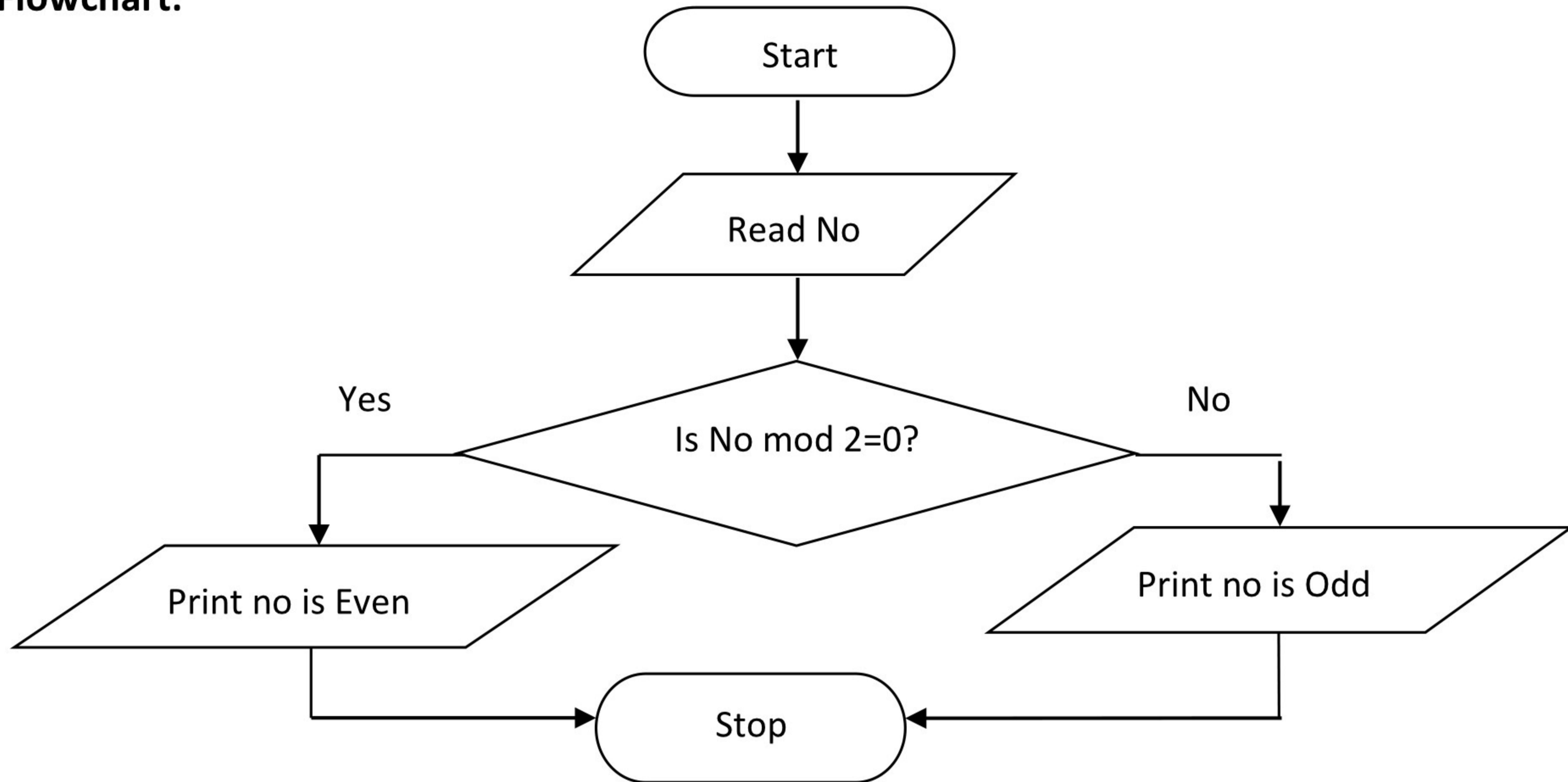
	Start / Stop	An oval represents to start or end of the flowchart.
	Input / Output (Read / Print)	A parallelogram represents input or output.
	Process	A rectangle represents a process
	Decision making	A diamond indicates a decision. When there are two paths , user have to choose one path with ans YES or NO , at that this symbol is used
	Connector	Indicates that the flow continues where a matching symbol has been placed.
	Arrows	A line is a connector that shows relationships between the representative shapes.

3. Write an algorithm and Draw Flowchart to find whether given number is even or odd.

Algorithm:

- Step 1 : Start
- Step 2 : Input no.
- Step 3 : If no mod 2=0, goto 4.
- Step 4 : Print given no is odd, goto 5.
- Step 5 : Print given no is even.
- Step 6 : Stop.

Flowchart:

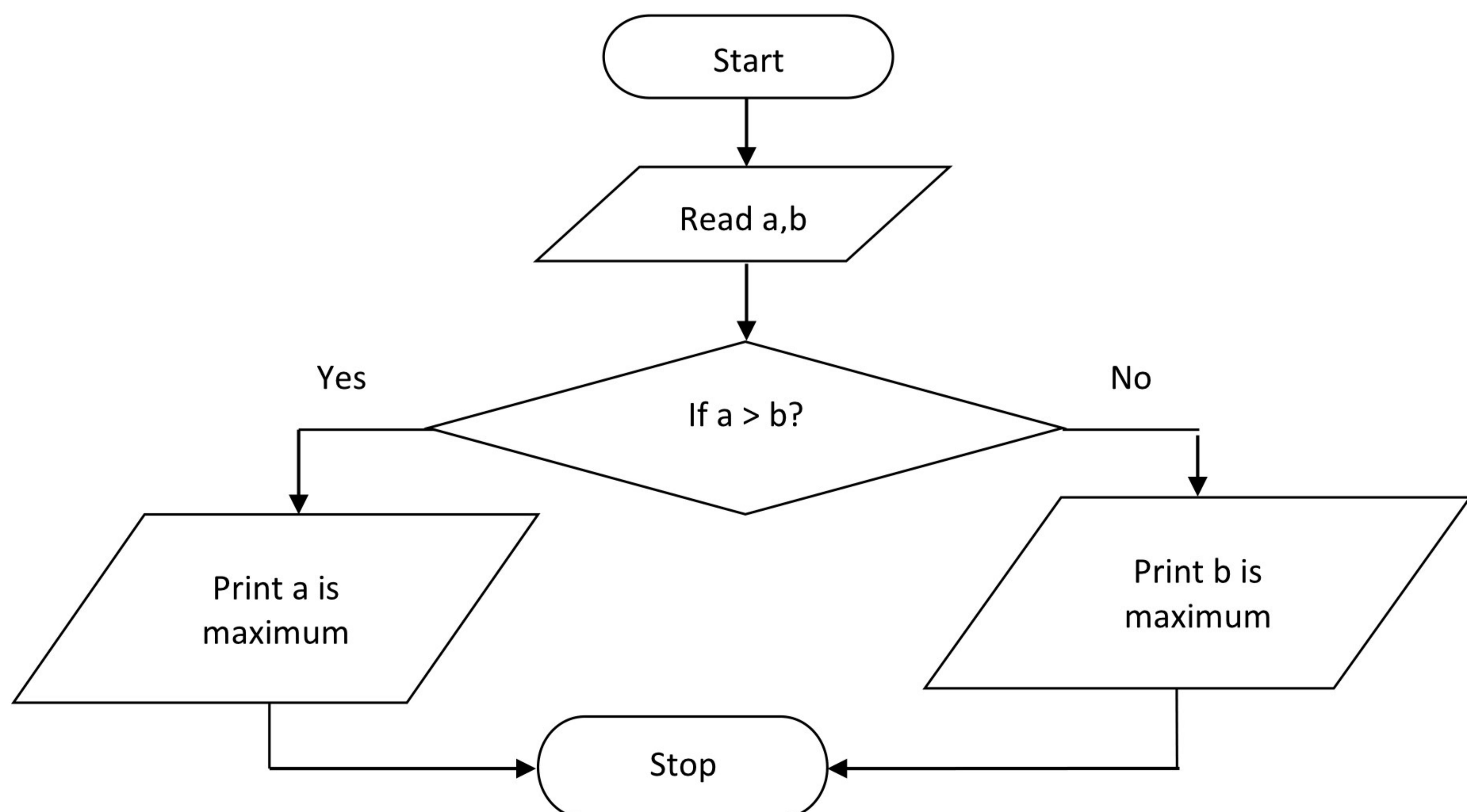


4. Write an algorithm and Draw Flowchart to find maximum number from a given 2 numbers

Algorithm:-

- Step 1 : Start
- Step 2 : Read a ,b
- Step 3 : If $a > b$, go to 5
- Step 4 : Print b is maximum, go to 6
- Step 5 : Print a is maximum
- Step 6 : Stop

Flowchart:

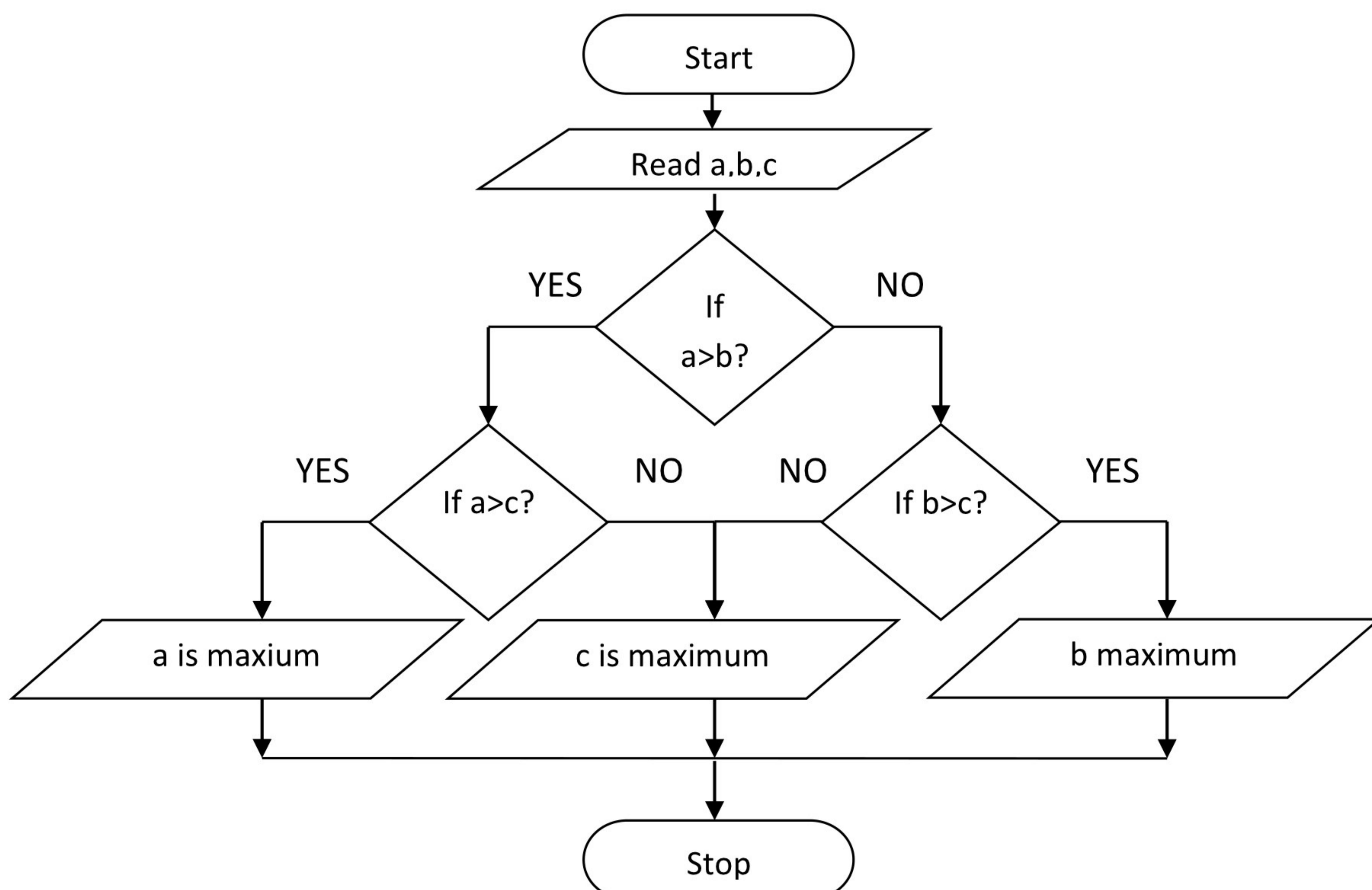


5. Write an algorithm and Draw Flowchart to print maximum number from a given 3 numbers.

Algorithm:-

- Step 1 : Start
- Step 2 : Read a ,b, c
- Step 3 : If $a>b$, go to 7
- Step 4 : If $b>c$, go to 6
- Step 5 : Print c is maximum, go to 10
- Step 6 : Print b is maximum, go to 10
- Step 7 : If $a>c$, go to 9
- Step 8 : Print c is maximum, go to 10
- Step 9 : Print a is maximum
- Step 10 : Stop

Flowchart:

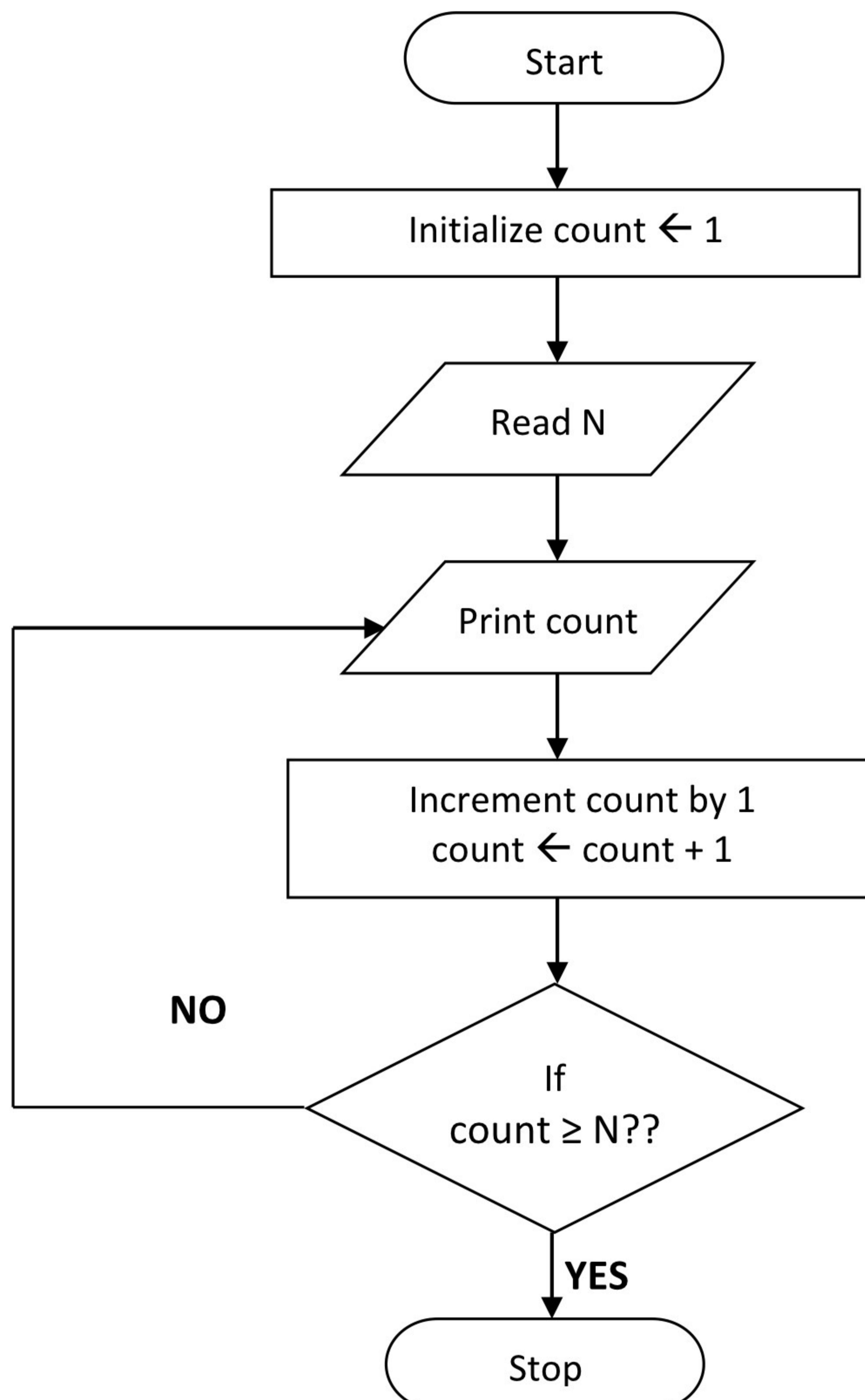


6. Write an algorithm and Draw Flowchart to print 1 to N numbers.

Algorithm:

- Step 1 : Start
- Step 2 : Initialize count $\leftarrow 1$
- Step 3 : Read N
- Step 4 : Print count
- Step 5 : Increment count by 1 , count \leftarrow count +1
- Step 6 : If count $\geq N$, go to 8
- Step 7 : Go to 4
- Step 8 : Stop

Flowchart:

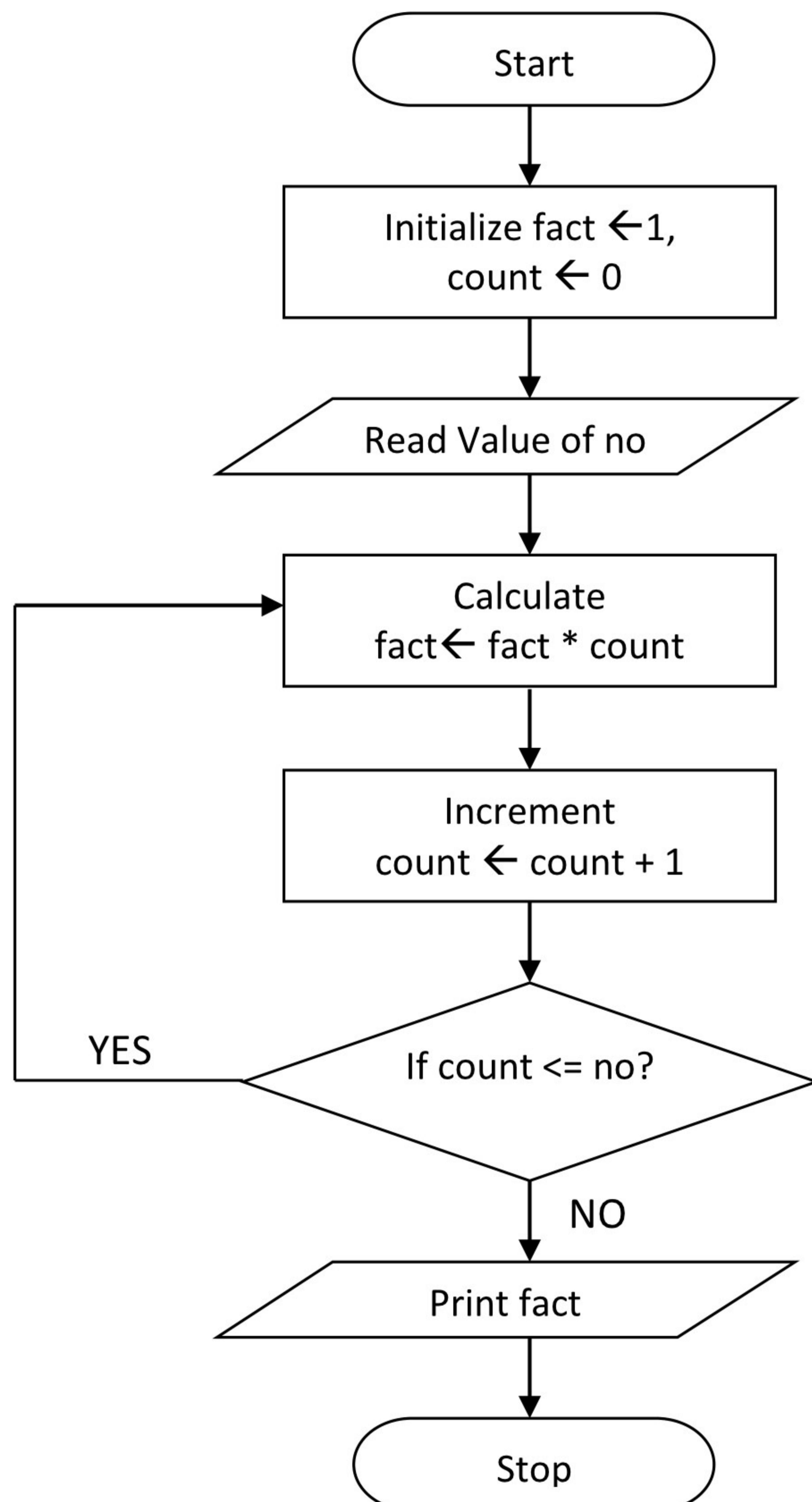


7. Write an algorithm and Draw Flowchart to find the factorial of a given number.

Algorithm:-

- Step 1 : Start
- Step 2 : Initialize count $\leftarrow 1$, fact $\leftarrow 1$
- Step 3 : Read no
- Step 4 : Calculate fact \leftarrow fact * count.
- Step 5 : Increment count by 1, count \leftarrow count+1.
- Step 6 : If count \leq no, goto 4.
- Step 7 : Print fact.
- Step 8 : Stop.

Flowchart:

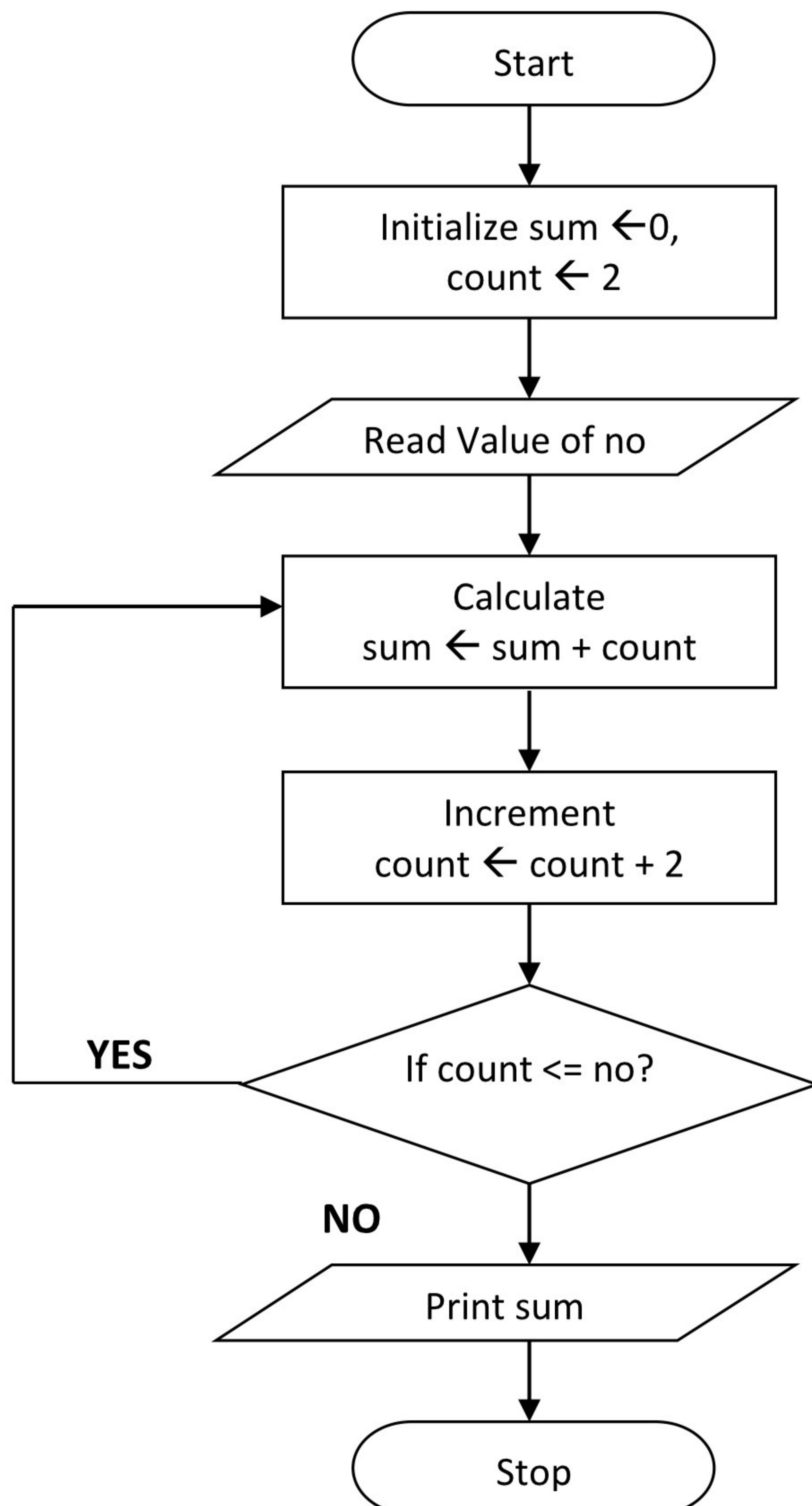


8. Write an algorithm and Draw a flowchart to print addition of EVEN numbers between 1 to N.

Algorithm:

- Step 1 : Start
- Step 2 : Initialize count $\leftarrow 1$, sum $\leftarrow 0$
- Step 3 : Read no
- Step 4 : Calculate sum \leftarrow sum + count
- Step 5 : Increment count by 1, count \leftarrow count+2
- Step 6 : If count \leq no, goto 4.
- Step 7 : Print sum
- Step 8 : Stop.

Flowchart:



NOTE: Now we want to write an algorithm and draw a flowchart to print addition of ODD numbers between 1 to N then in initialization step, replace count's value by 1 instead of 2.

9. Write an algorithm to swap value of two variables.

Algorithm:

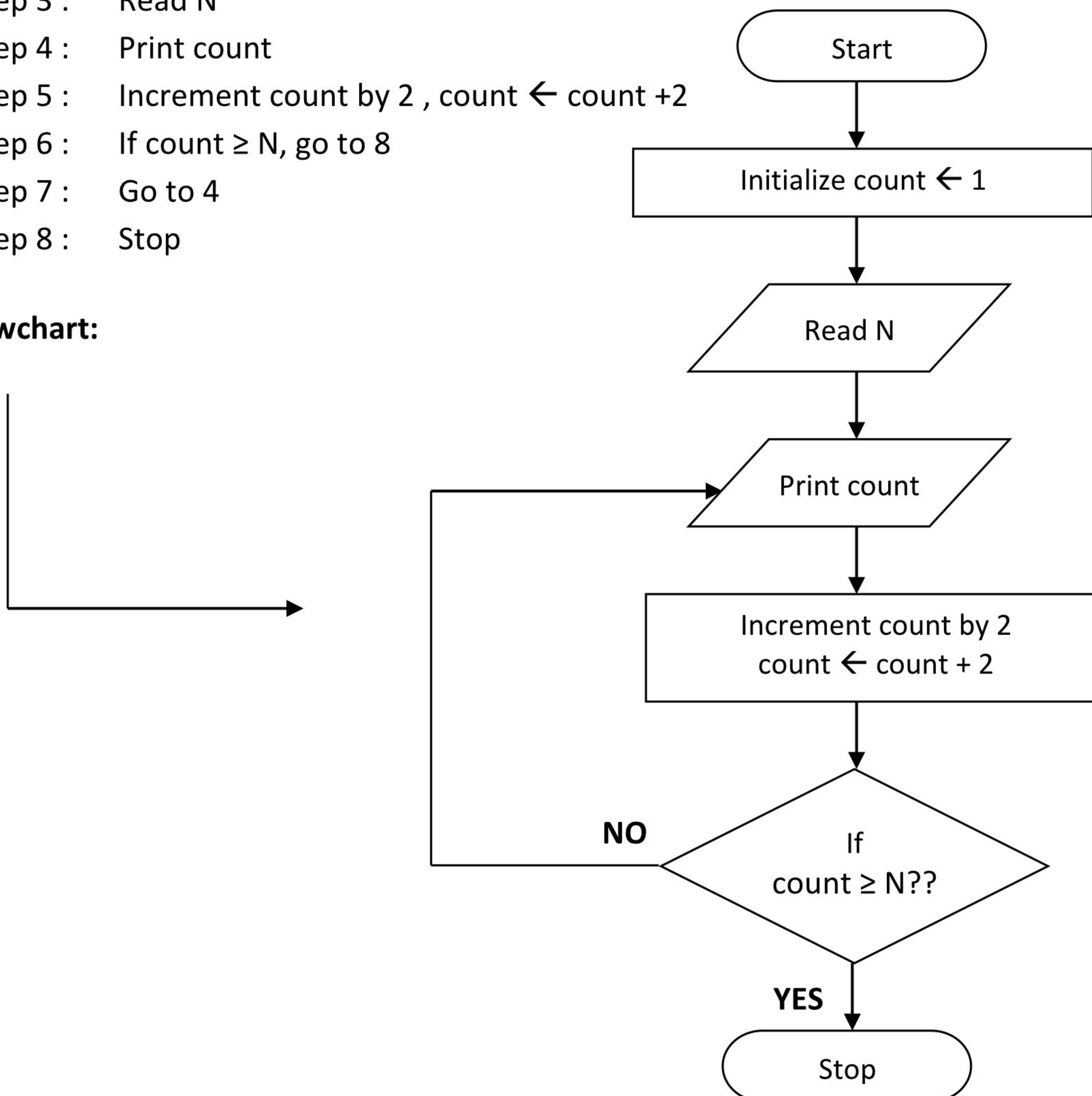
Step 1 : Start
Step 2 : Initialize $a \leftarrow 0, b \leftarrow 0, c \leftarrow 0$
Step 3 : Read Value of a, b
Step 4 : Print value of a, b
Step 5 : Give value of a to $c, c \leftarrow a$
Step 6 : Give value of b to $a, a \leftarrow b$
Step 7 : Give value of c to $b, b \leftarrow c$
Step 8 : Print value of a, b
Step 9 : Stop.

10. Write an algorithm and Draw a flowchart to print ODD numbers between 1 to N.

Algorithm:

Step 1 : Start
Step 2 : Initialize count $\leftarrow 1$
Step 3 : Read N
Step 4 : Print count
Step 5 : Increment count by 2 , $count \leftarrow count + 2$
Step 6 : If $count \geq N$, go to 8
Step 7 : Go to 4
Step 8 : Stop

Flowchart:



11. Application of C language.

- Used for creating computer applications.
- Used in writing embedded softwares.
- Used for developing testing softwares & simulators.
- Used to implement different operating system operations.