

Course - Introduction (C++)

Topic - Flowcharts

## Basics of Problem Solving

- How to approach any given problem
- How to structure your solution

## Steps for Problem Solving

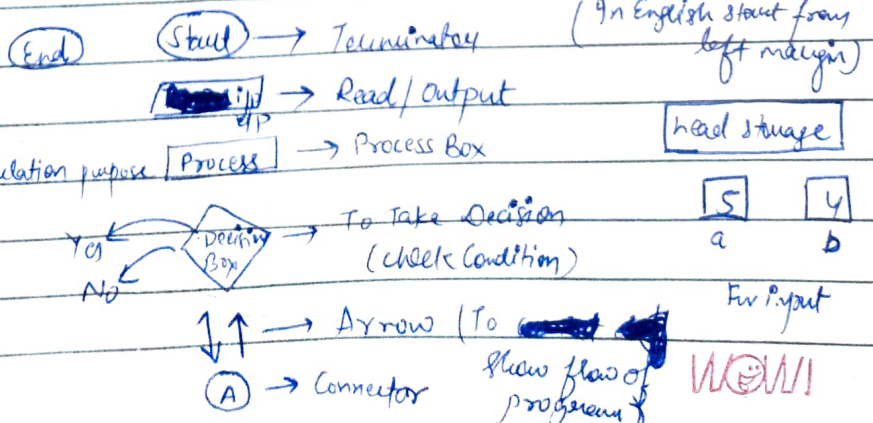
Focus on  
this  
part  
first

- 1) Analyse your problem → what is i/p and what is desired o/p.
- 2) Break down your problem into smaller subparts
- 3) Write down solution on paper.
- 4) Verify your solution by checking it on a no. of test cases.
- 5) Write code

# Flowcharts - Diagrammatic representation illustration a solution to a given problem and allows to break down our problem into smaller subparts and display them in visually pleasing way.

- Useful for documentation → For Module, we prepared a separate documentation
- Communicate our solution to anyone
- Maintenance purpose

## # Flowchart Components -



## # Add Two Numbers

Start

Read a, b

sum = a + b

Print sum

end

a	b
3	4

9

Sum

## # Read P, R, T and calculate SI

Start

Read P, R, T

 $SI = \frac{P \times R \times T}{100}$ 

Print SI

end

1000

P

2

R

3

T

$$SI = \frac{1000 \times 2 \times 3}{100} = 60$$

## # Average of Three Numbers

Start

Read a, b, c

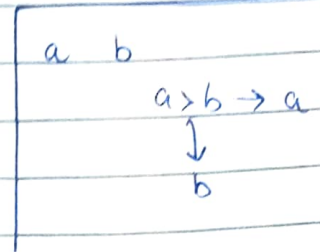
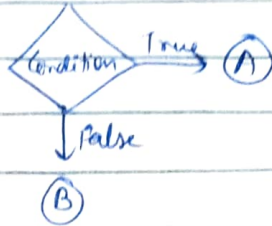
 $avg = \frac{a+b+c}{3}$ 

Print avg

end

WOW!

# Decision Box → whenever we want to take any decision  
 If it is raining out then we take umbrella out if it's not then not.



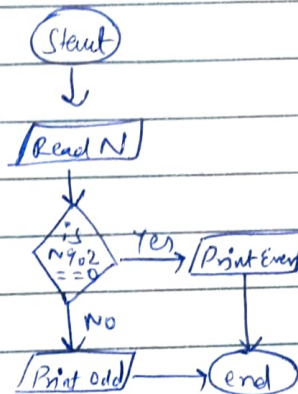
# Check No. for Even or Odd

$n \% 2 == 0 \rightarrow \text{even}$

$n \% 2 != 0 \rightarrow \text{odd}$

↓  
modulus operator → remainder  $\rightarrow 5 \% 2 \rightarrow 1$

divide operator → quotient  $\rightarrow 5 / 2 \rightarrow 2$



$n = 7$

$n = 10 \rightarrow \text{Assignment op}^r$

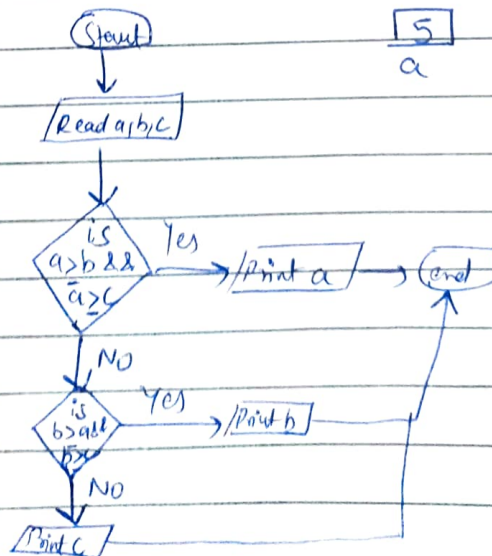
$n == 0 \rightarrow \text{Equality check op}^r$

# Largest of 3 Numbers

$a = 5$	$a = 5$
$b = 2$	$b = 6$
$c = 4$	$c = 1$

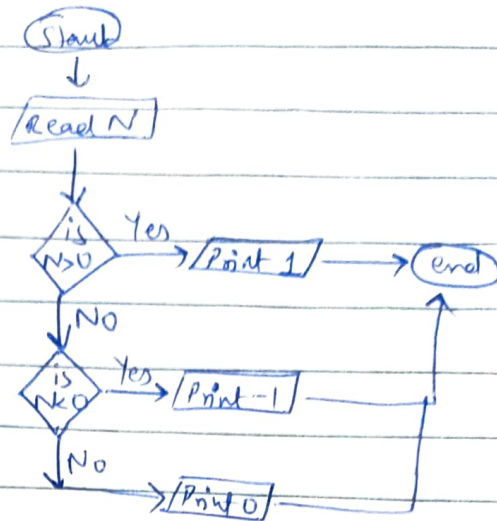
$a = 5$	$\geq$
$b = 5$	
$c = 2$	

5	4	8
a	b	c

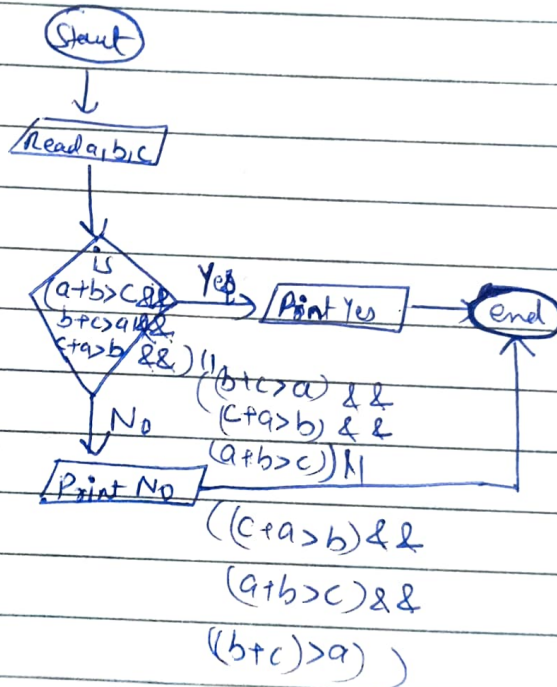




## # Check Number



## # Valid Triangle



# Loops → To perform repetitive task multiple no. of times in single go

$N \rightarrow 1 \text{ to } N$

$N=5$  , 1 to 5 | 1 2 3 4 5

$N=5$  | 1 2 3 4 5

nextNumber = 1

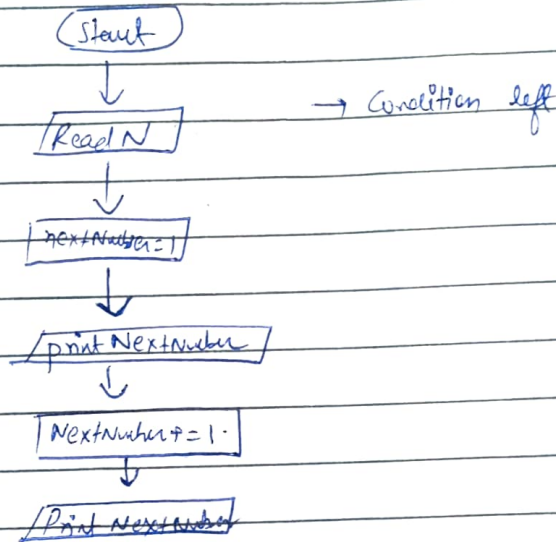
2

3

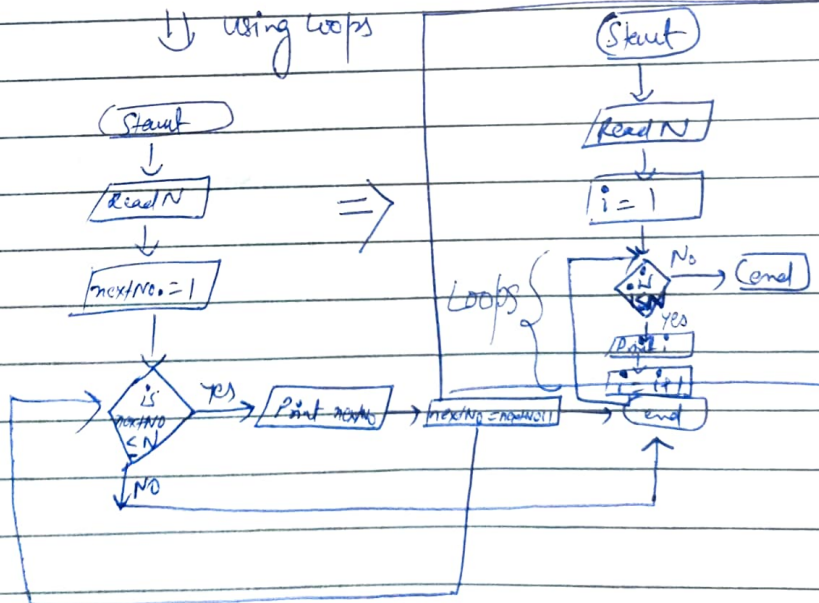
4

5

$(\text{nextNumber} \leq N)$  → Yes → print nextNumber → NextNumber++  
 No → Stop

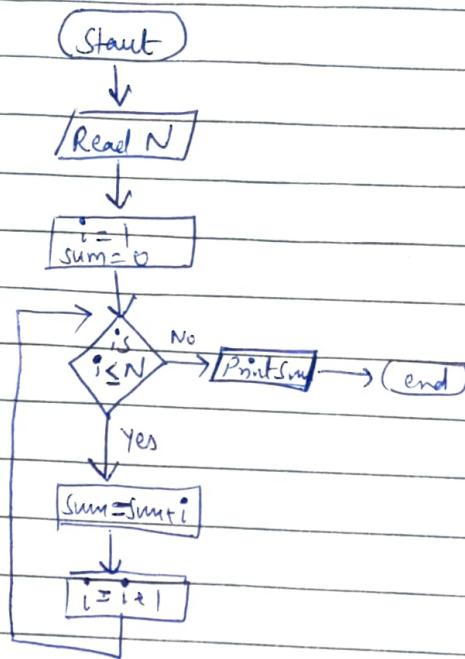


↓ using loops

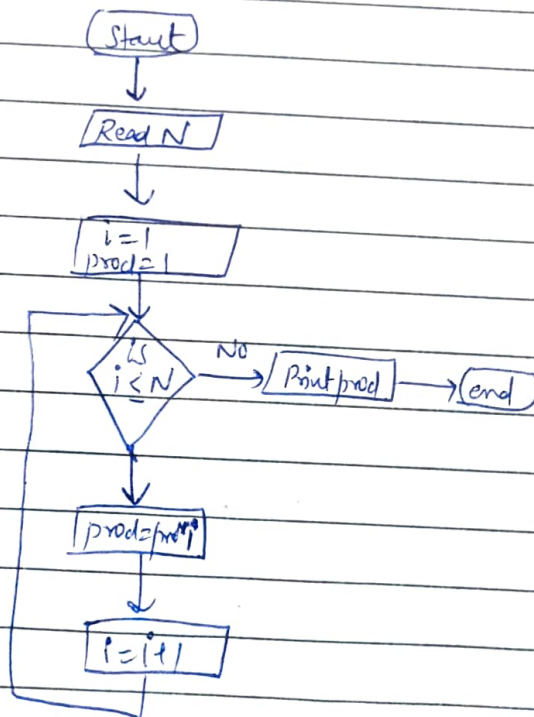


# Sum of Numbers Till N

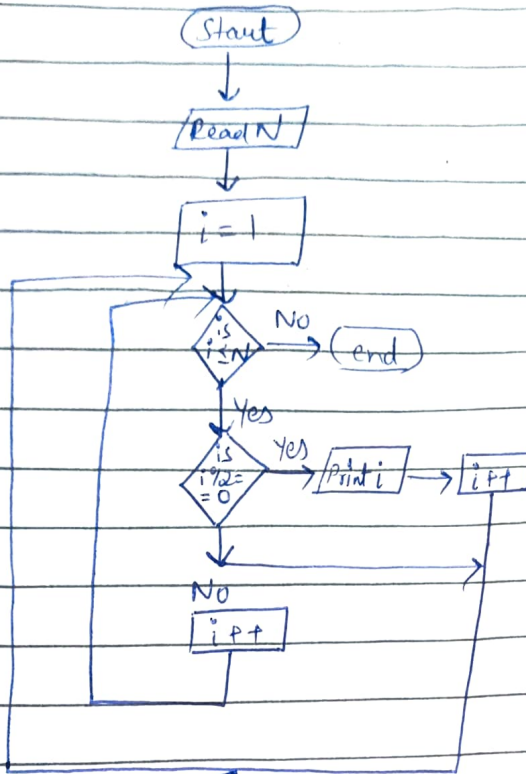
$i \leq 5$   
 $i = 1, 2, 3, 4, 5$   
 $Sum = 1 + 2 + 3 + 4 + 5$



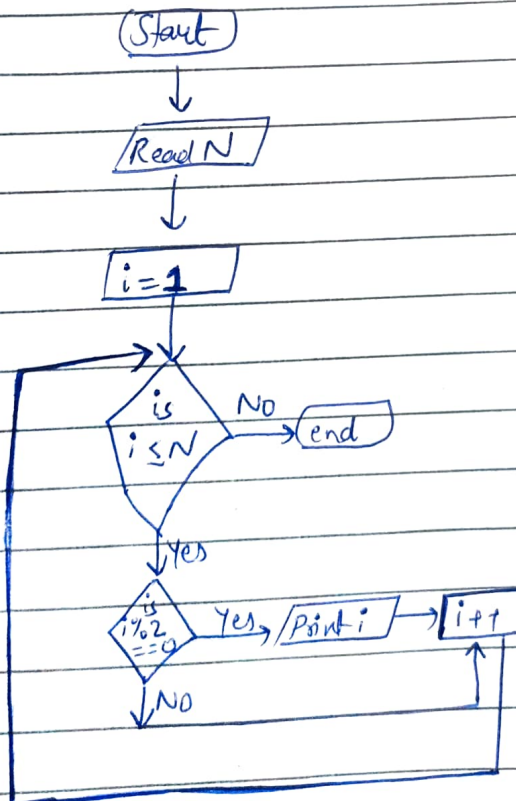
# Product of Integers from 1 to N



# # Print Flow of Even Numbers



OR





# # Largest of N numbers

$N \rightarrow 5$

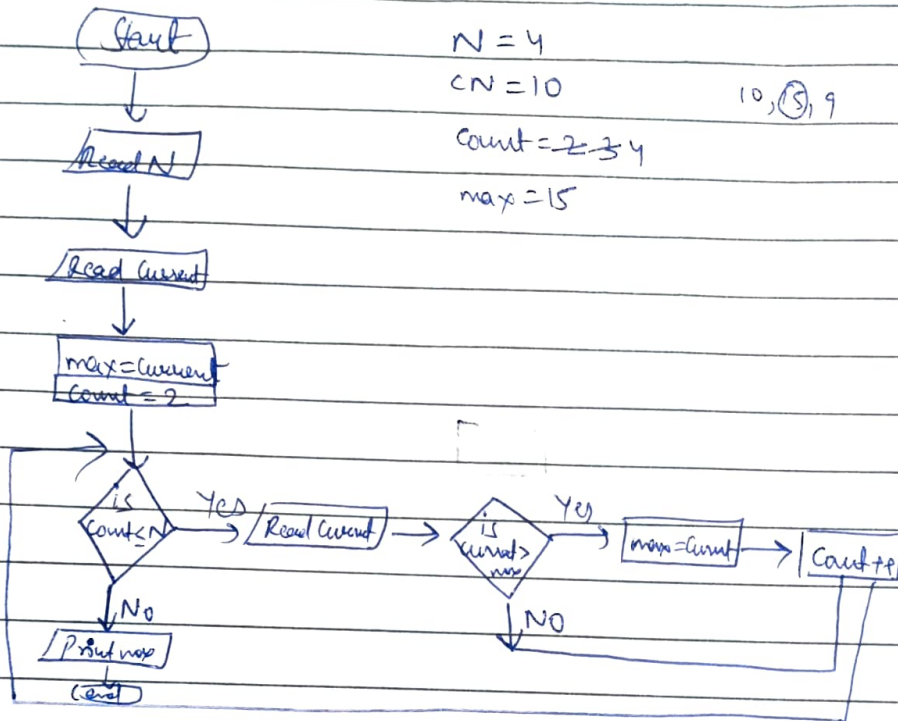
10, 15, 13, 14, 20

$N = 5$

Current Number = ~~10~~ 15 ~~13~~ 14 20

max = Current Number = ~~10~~ 15 20

count = ~~1~~ 2 3 ~~4~~ 5 6



$N = 4$

$CN = 10$

10, 15, 9

count = 2, 3, 4

max = 15

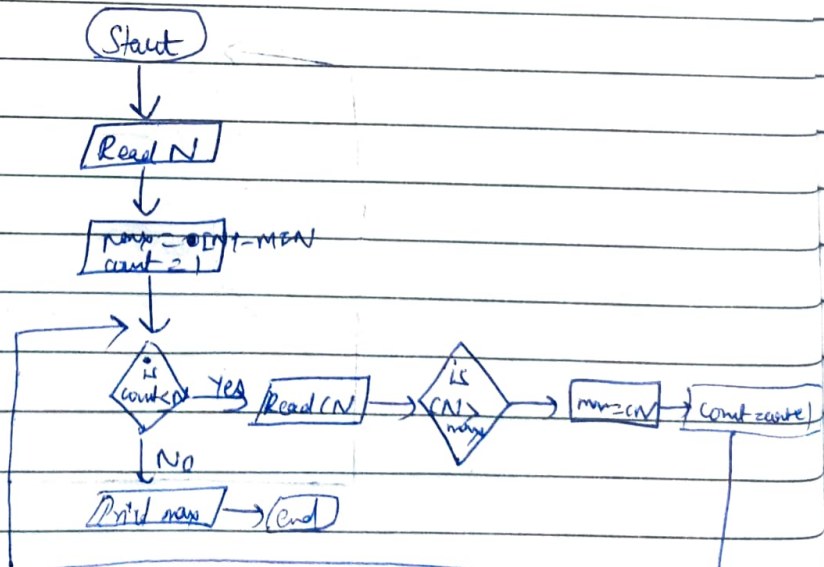
→ If  $N = 0$

max = -99999

~~CN = -10~~

~~-15~~

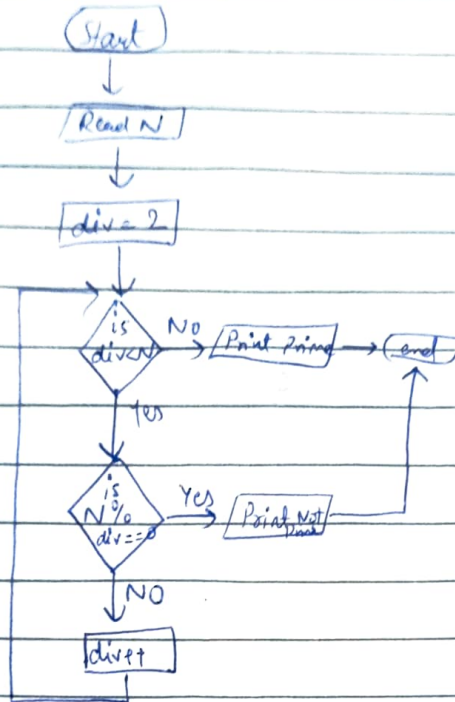
-16





# Check Prime $N = 15$ 

2 to 14  $\rightarrow 15 \% (2 \text{ to } 14) \rightarrow \text{Yes} \rightarrow \text{Not Prime}$   
 $\rightarrow \text{No} \rightarrow \text{Prime}$



7

 $2 < 6$  $7 \% 2 \neq 0$  $3 < 6$  $7 \% 3 \neq 0$  $4 < 6$  $N = 9$  (2 to 8) $9 \% 2 \neq 0$  X $9 \% 3 = 0$  ✓ $N = 5$  (2 to 4) $5 \% 2 \neq 0$  X $5 \% 3 \neq 0$  X $5 \% 4 \neq 0$  X

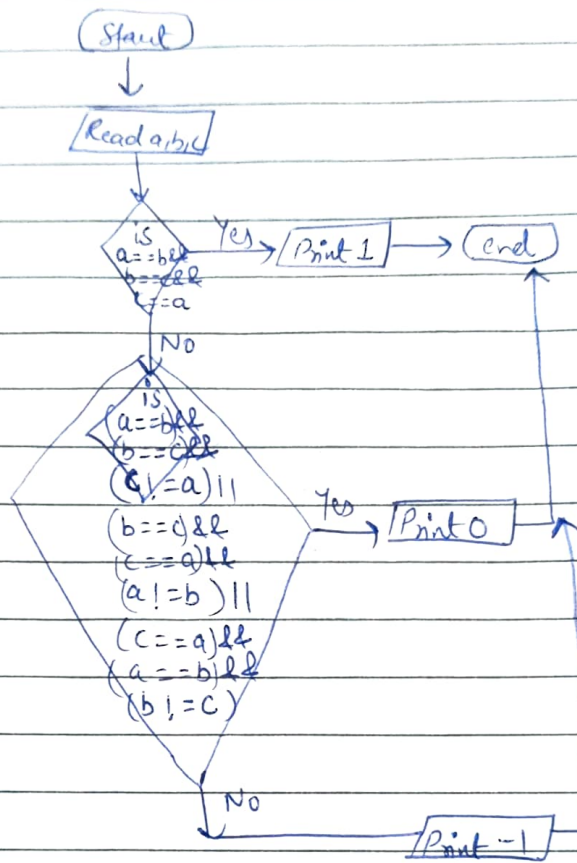
$div \leq N/2$   
 $div \neq div \leq N$  } To reduce the no. of iterations

Basic Points

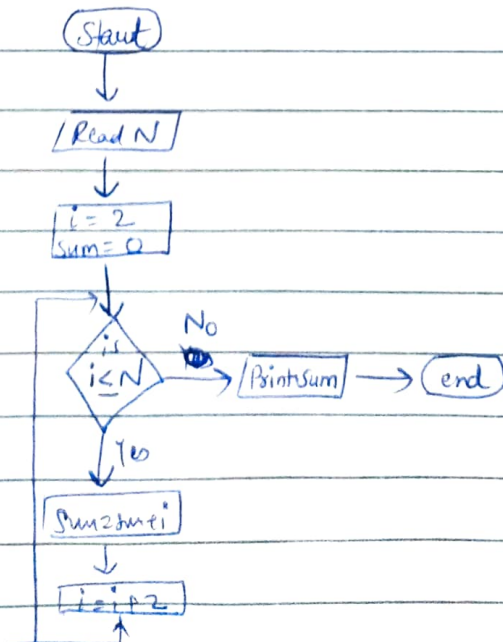
\* Algorithm  $\rightarrow$  Step by step approach to solve any given problem

\*

## # Check Triangle



## # Sum of Evens



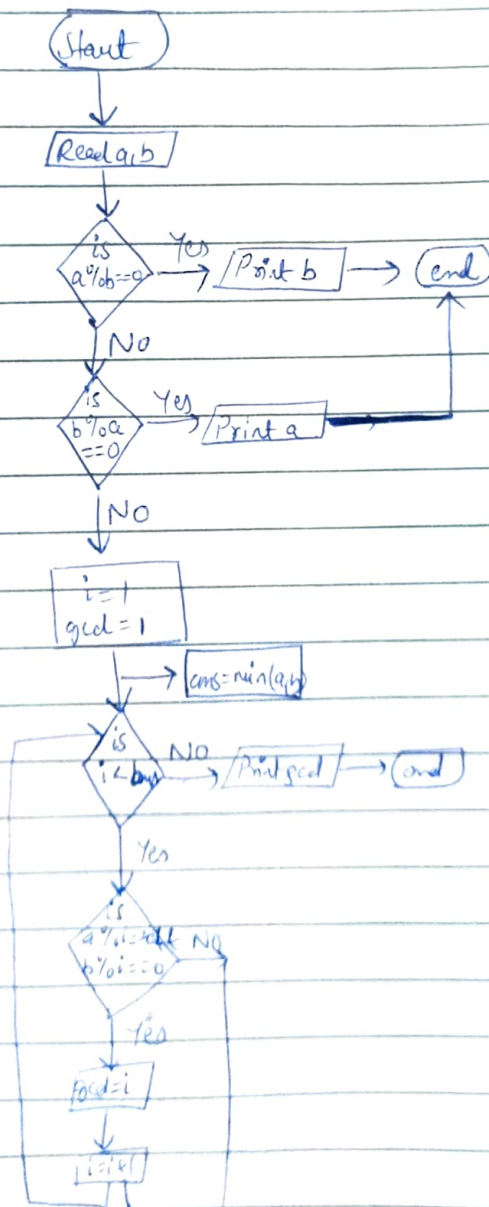
# Find G.C.D (Greatest Common Divisor)

$$6, 8 \rightarrow 6 \% 2, 8 \% 2$$

$$\begin{array}{r} 1 \\ 6 \overline{) 8} \\ \underline{6} \phantom{0} \\ 2 \end{array}$$

$$\begin{array}{r} 2 \overline{) 6} \phantom{0} \\ \underline{6} \\ 0 \end{array}$$

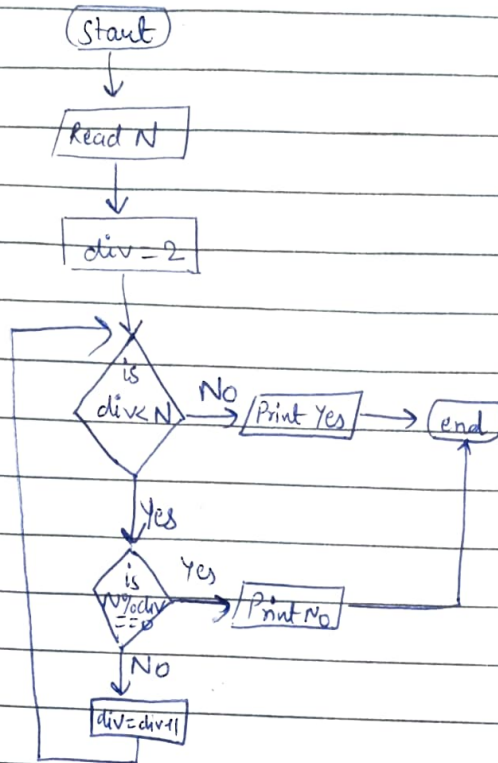
$\text{gcd}(2)$



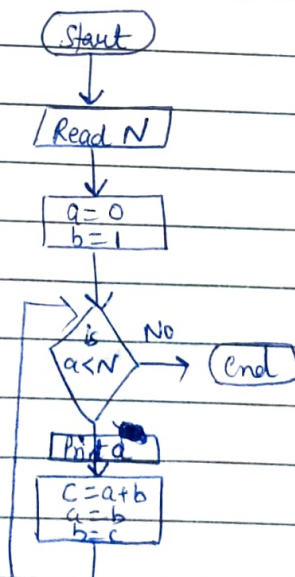
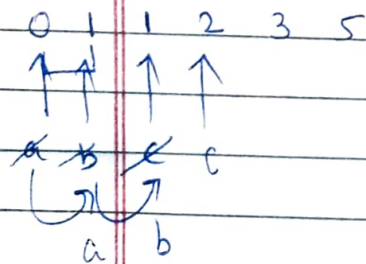


## # Check Prime Number

15, 17



## # All Fibonacci Numbers



N = 5

a = 0, b = 1

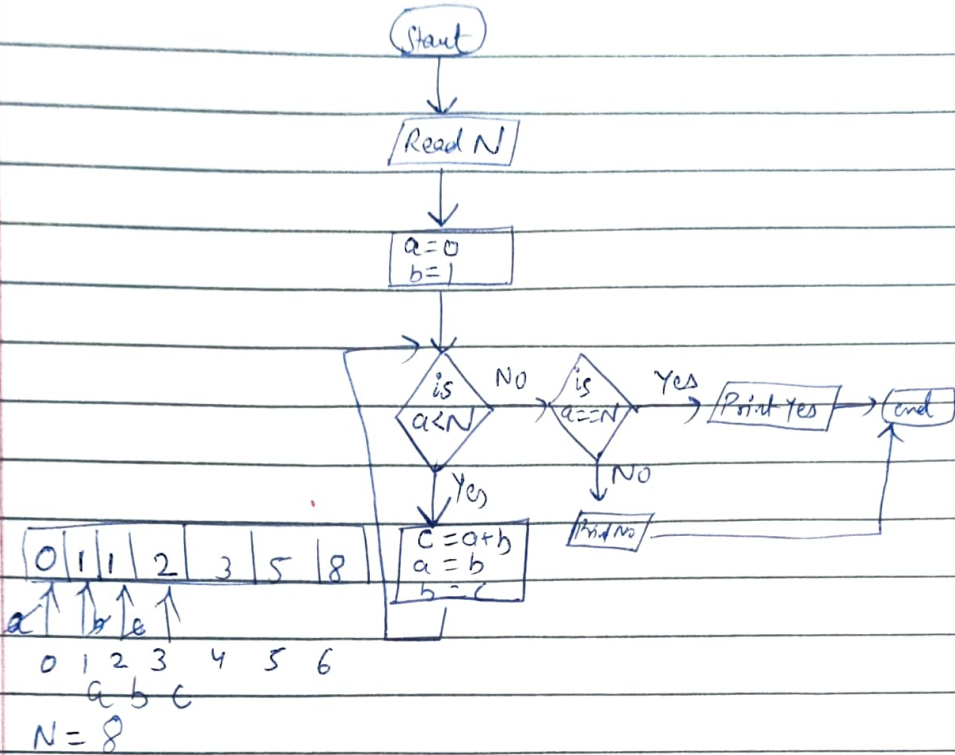
1 < 5

$C = a + b$   
 $a = 1$   
 $b = a$

iterate

0 1 1 2 3

## # Member of Fibonacci



# Flowcharts are the building blocks of any programs written in any language.

END OF

FLOWCHARTS

MODULE