Sequences

Sequences are the main logical structure of algorithms. When creating algorithms, the instructions are presented in a specific correct order.

A **sequence** can contain any number of instructions but each instruction must be run in the order they are presented. No instruction can be skipped.

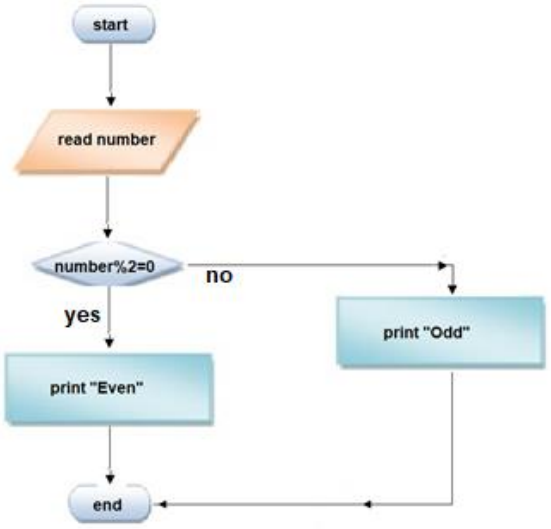
Ex1 : for sequence

Write an Algorithm to add two numbers entered by the user.

Step 1: Start
Step 2: Declare variables num1, num2 and sum.
Step 3: Read values num1 and num2.
Step 4: Add num1 and num2 and assign the result to sum.
Step 5: Display sum
Step 6: Stop

example

Write an algorithm – flowchart – pseudocode to check whether a given number is even or odd.



Read number

If (number%2=0) then

print (“Even”)

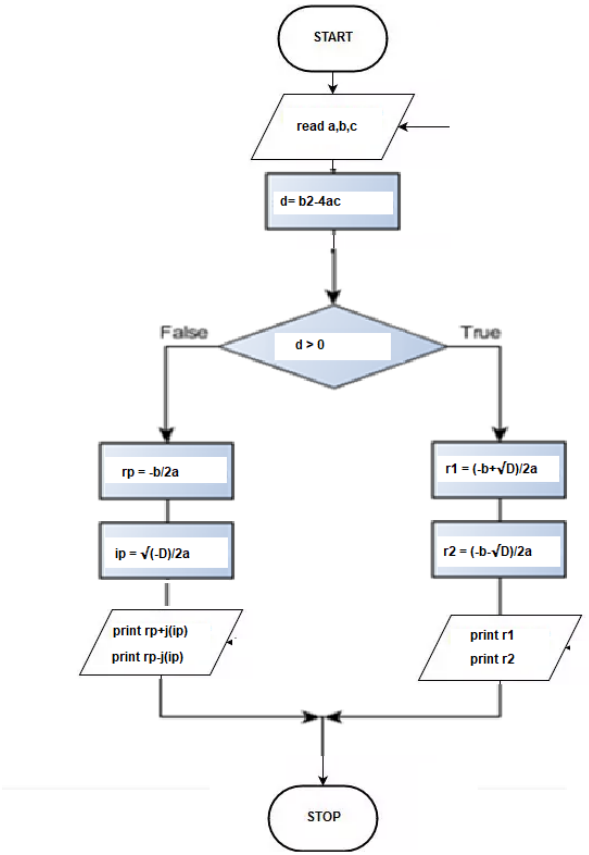
Else

print(“Odd”)

endif

example

Write an algorithm – flowchart – pseudocode to find Roots of a quadratic equation ax2 + bx + c = 0



Step 1: Start

Step 2: Declare variables a, b, c, D, x1, x2, rp and ip;

Step 2.1 read a,b,c

Step 3: Calculate discriminant

D ← b2-4ac

Step 4: If D ≥ 0

r1 ← (-b+√D)/2a

r2 ← (-b-√D)/2a

Display r1 and r2 as roots.

Else

Calculate real part and imaginary part

rp ← -b/2a

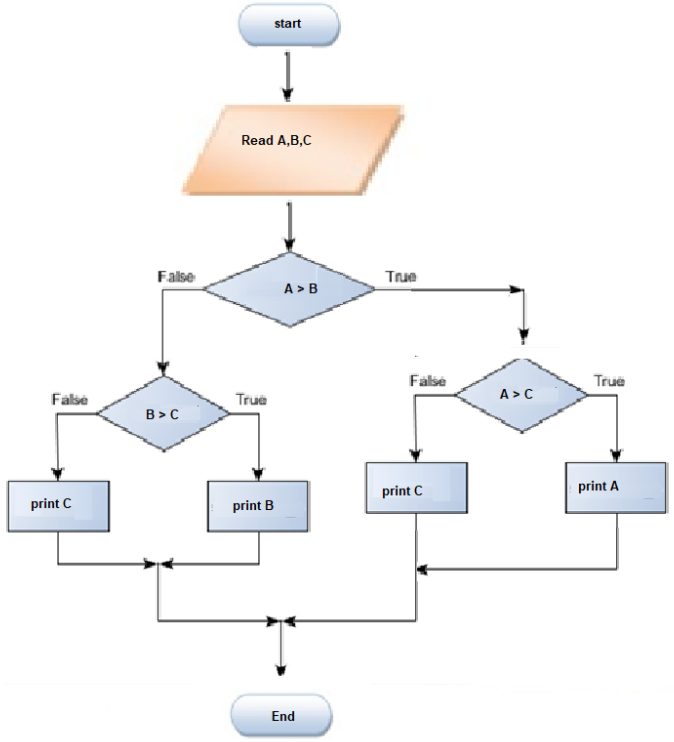
ip ← √(-D)/2a

Display rp+j(ip) and rp-j(ip) as roots

Step 5: Stop

Example(multi way branch)

Write an algorithm – flowchart – pseudocode to Find the largest number among three different numbers



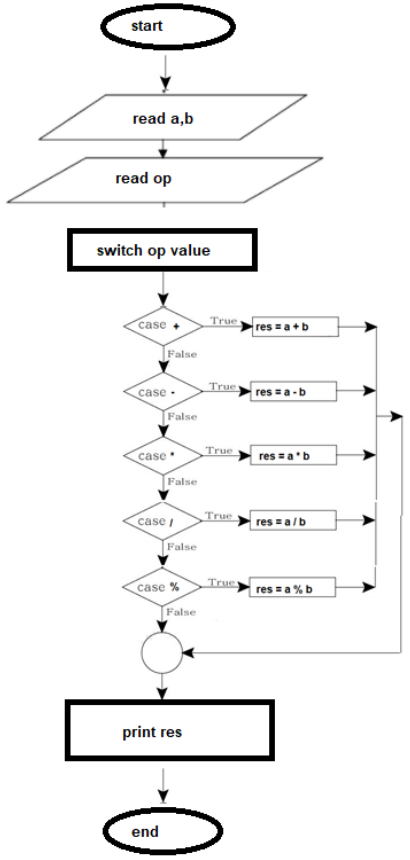
Step 1: Start
Step 2: Declare variables a,b and c.
Step 3: Read variables a,b and c.
Step 4:

```
    If a > b
            If a > c
                    Display a is the largest number.
            Else
                    Display c is the largest number.
            END IF
    Else
            If b > c
                    Display b is the largest number.
            Else
                    Display c is the greatest number.
            END IF
          END IF
```

Step 5: Stop

Example

Write algorithm – flowchart – pseudocode that Input two numeric values and depend on operator as one char that calculate the value of a + b if operate is ‘+’, a - b if operate is ‘-’, and so on for *,%,/ Parameters a and b are type int and op is type char.



Step 1: read a,b

Step 2: read op

Step 3:

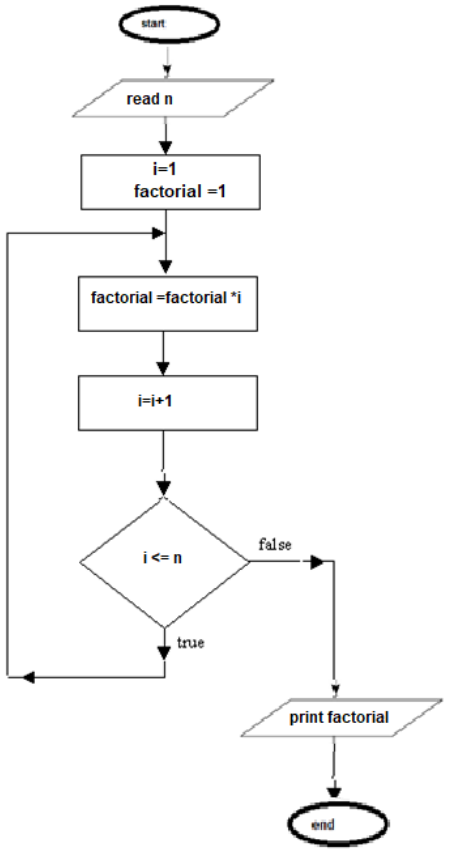
Case (op)

Case ‘+’: res = a + b
Case ‘-’ : res = a – b
Case ‘*’ : res = a * b
Case ‘/’ : res = a / b
Case ‘%’: res = a % b

End Case

Example

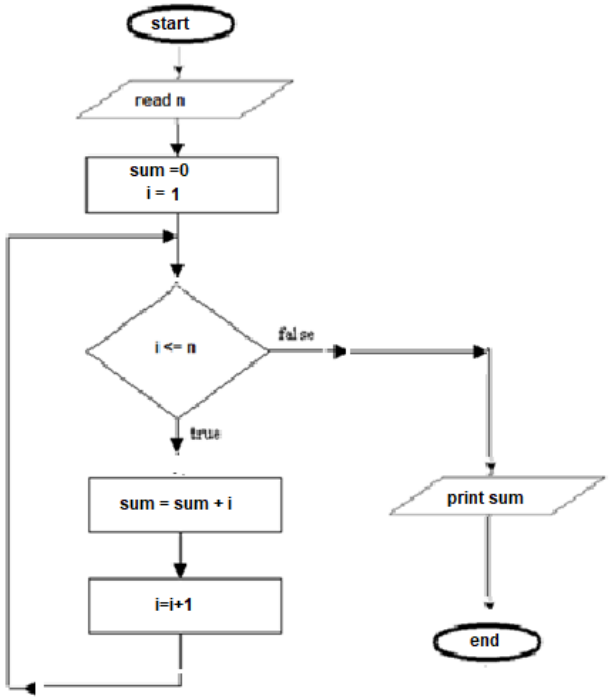
Write algorithm – flowchart – pseudocode to calculate the Factorial of a number entered by the user.



Step 1: Start
Step 2: Declare variables n, factorial and i.
Step 3: Read value of n
Step 4: Initialize variables
factorial ← 1
i ← 1
Step 5: Repeat the steps until i = n
5.1: factorial ← factorial*i
5.2: i ← i+1
Step 6: Display factorial
Step 7: Stop

example

Write algorithm – flowchart – pseudocode to calculate sum of digits in all numbers from 1 to n Given a number n.



Read n

Sum = 0

i =1

While (i<=n)

sum = sum+i

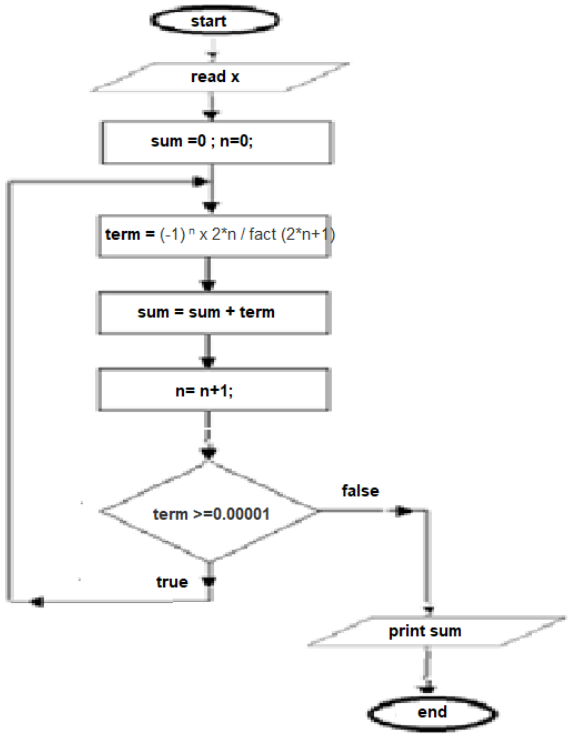
i=i+1

End while

Print sum

example

Write algorithm – flowchart – pseudocode to calculate sin(x) using the formula $\sin x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}$ until the term less that 0.00001.



Read x

Sum = 0

n=0

do

term = (-1) n x (2*n+1) / fact (2*n+1)

Sum = Sum +term;

n++;

While (term >=0.00001)

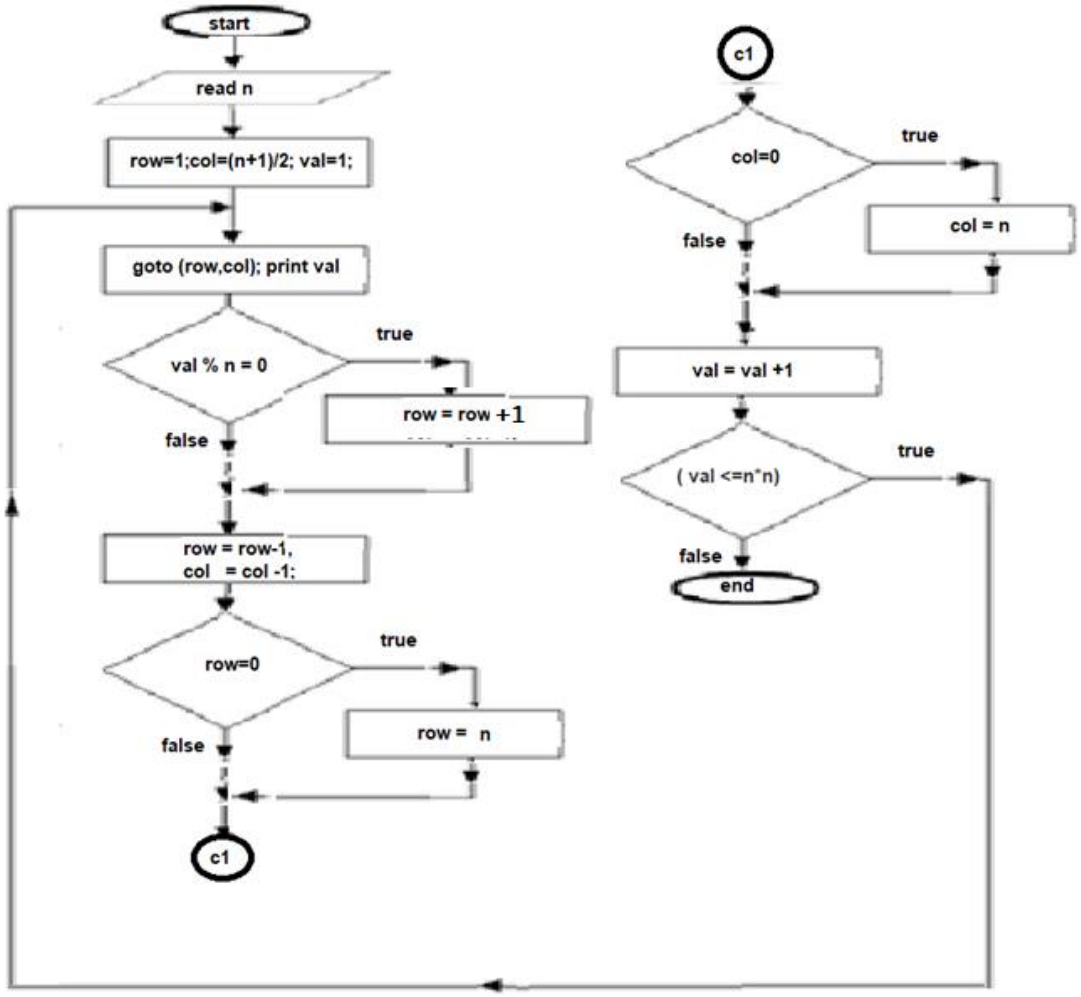
Print “sin of “,x,”=“,sum

Hint : use the concept of function to build the function Fact(int) the to calculate the factorial needed in each term .

General Example

Write algorithm – flowchart – pseudocode to A magic square is a square array of numbers consisting of the distinct positive integers 1, 2, ..., n^2 arranged such that the sum of the n numbers in any horizontal, vertical, or main diagonal line is always the same number

6	1	8
7	5	3
2	9	4



Read n

Row=1;col = (n+1)/2 ; val =1;

do

goto (row,col)

print val

if (val % n ==0) then

row=row+1

else

row=row-1;

col = col -1

endif

if (row=0) then

row=n

endif

if (col=0) then

col=n;

endif

val = val +1;

While (val <=n*n)