🐍 **PYTHON**

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**Creator of Python - *Dutchman Guido van Rossum***

**STRUCTURE**

input algorithm output

INPUT

they are of 2 types

 **Run time/dynamic**( if the error occurs during run time it is said to be run time error)

 **Compile time/static**( if the error occurs due to syntactical errors or spelling mistakes then it is called as compile time error)

In python if input() - is a default function for string n=input()// n stores data in string format n==int(input())//n stores data in integer format

Python doesn't use braces, it uses the concept of indentation Colon is used in conditional statements

*Some important things to remember:*

# OPERATORS

 MEMBERSHIP OPERATOR ⇒in only works with strings checks if first thing is present in second

#ex 1

if 'hi ' in 'hi,hello':

print("hi")

else:

print("bye")

print("abc")

#prints bye abc because 'hi ' as has space in it

#ex 2

if 1 in 123:

print(1)

elif 1 in '123':

print(2)

else:

print(3)

#membership operator only works on strings and not on integers

 IDENTITY OPERATOR ⇒is

checks if both are identical are not

if not true is true:

print(true)

elif not true is false:

print(false)

else:

print("error")

#o/p: false

 TERNARY OPERATOR

SYNTAX  <expression>if<if condition>else<else condition>

x=y=10

z=1+(x if x>y else y)+2

print(z)

#ans=13

#ex:1

age =20

x 'can vote' if age>18 else 'cannot vote'

print(x)

#o/p:can vote

#ex 2:

x=y==10

z= 1+(x if x>y else y)+2

#o/p:13

## ~Derived Datatypes

|  |  |  |  |
| --- | --- | --- | --- |
| List | Tuple | Dictionary | Set |
| a collection of different datatypes | tuple doesnʼt allow the data to be changed it is immutable. | in python dictionary contains key and values | set only shows unique values |
| empty list - a=[ ] | empty tuple - a=( ) | empty dictionary - a={ } | empty set - a=set( ) |
| a[ ] print(type(a)) o/p:  <class ‘listʼ> | a() print(type(a)) o/p:  <class ‘tupleʼ> | a{} print(type(a)) o/p:  <class ‘dictionaryʼ> | a=set() print(type(a)) o/p:  <class ‘setʼ> |
| list rep:  a=[ˮheyˮ,ˮhˮ,3.09,9 o/p:  [ˮheyˮ,ˮhˮ,3.09,9 | tuple rep:  a=(ˮheyˮ,ˮhˮ,3.09,9 o/p:  (ˮheyˮ,ˮhˮ,3.09,9 |  | a=ˮbijenˮ a[0]=p  print(a) |
| always represented by index value |  |  | #this only prints bijen as string is not mutable |
| list is mutable |  |  |  |

just extra

#ex 1

if 3 and 0 or 2:

print("true")

else:

print("false")

#prints true

#ex 2

if 3>7:

if -3>-6:

print("nested if")

else:

print("nested else")

else:

print("else")

#o/p: else

#ex 3

if 11>15 or 12<15:

if true and false:

if not false:

print(1)

if 101 and 543:

print(2)

else:

print(3)

else:

print(4)

all non zero integers will return true in python and only zero will return false

if 999:

print("hi")

#this prints hi as 999 is a non zero integer

condition is a statement which will return in true or false

if print("hello"):

print("hi")

#this prints only hello as - if print("hello") is a statement and not

while print("hi"):

print("hello")

#prints hi

while 999:

print("hello")

#prints hello n number of times

#if while 0: then it prints no output

Python stores variables with same value in the same location

checking location of a variable : use id()

a=1

b=1

print(id(a),id(b))

#prints the location of the variable

else can be used inside loops

only (only when thereʼs no break inside loop i.e. for/while will

run completely)

for i in range(3):

print(i,"i am sorry")

#break(if used prints "0 i am sorry"

else:

print("not sorry")

o/p:

1. i am sorry
2. i am sorry2 i am sorry not sorry continue will skip the lines below it and go to next statement or loop compile time error : syntax or mistake in program run time error : error after running default datatype - string

basically concatenates ex : n=2 then n+n=22

n=int(input())

ans=n+n

print(ans)

o/p:

4

8

python doesnʼt have concept of braces it uses indentation use colon(:) -to represent end of condition

-after else:

flag-uses binary digits, used when there are only two conditions

***2 MAIN CONCEPTS OF PROGRAMMING***

## CONDITIONAL

-if: (exactly one condition)

#ex1

n=int(input())

if n%2==0:

b=7

print(n, b) #program doesn’t execute because of indentation

#ex2

if n%2==0:

b=7

print(n, b)

-if else: (exactly 2 conditions)

n=int(input())

if n%2==0:

b=7

print(n, b)

else:

print(b) #doesn't get printed as b is defined in if block not

#o/p: name b is not defined//run time error

-**elif**(no limit to no of conditions) example:

n=int(input())

if n>0:

print("positive") #(indendation is important in the next statement

elif n<0:

print("negative")

else:

print("0")

-nested if (all conditions need to be satisfied)

if height<5.5

if weight==65

if gender==female

print("All conditions satisfied")

-dictionary(switch can be implemented in python using dictionary(switcher.get() is the function used to get the value from switcher)

## CONTROL

-for -

while loop -*while loop doesn't work if it equal to zero or if it starts from zero* -no do while loop in python

break continue -

pass : has no effect on the program

\*programs done using for loop or while loop can also be done using recursion

**FOR LOOP**

\*reduces one by default. if 10 is given itʼll run up to 9 SYNTAX  for i in range():

inside range we have ~initialization

~number of times to iterate

~step(basically skipping)

example :

n=input()

for i in range(1,10,2):

print(n)

\*try 1,10,2 1,10,2 10,1,2 so on…

\*in order to get the values of i or know how many times the loop is getting executed we can write the program like this

n=input()

for i in range(10):

print(i,n)

o/p:

1. i am sorry
2. i am sorry
3. i am sorry3 i am sorry 4 i am sorry 5 i am sorry 6 i am sorry
4. i am sorry
5. i am sorry9 i am sorry

**Extra examples:**

n=input()

for i in range(1,10,2):

print(i, n)

//range is 1 to 10 and it'll jump by 2 so output will be

1 sorry

3 sorry 5 sorry

7 sorry 9 sorry

n=input()

for i in range(1,10,-2):

print(i, n)

no o/p is generated as range is 1 to 10 but step is 2 which means move behind which can't be

done

n=input()

for i in range(-10,1,-2):

print(i, n)

no o/p as 102 is 12 which means to move behind it can't be done

n=input()

for i in range(10,-1,-2):

print(i)

o/p 8 6 4

2

0

***In python loops can be executed along with conditional statements which cant be done in c*** example:

#ex1

n=input()

for i in range(3):

print(i, n)

else:

print("not sorry")

#ex2

n=input()

for i in range(3):

print(i ,n)

break

else:

print("not sorry")

#o/p: 0 i am sorry

#since break is given else part is not executed

#ex3

n=input()

for i in range(3):

print(i)

continue

print("hi")

else:

print("not sorry")

ex3 o/p:

0

1

2

not sorry

#after continue the lines which will be written those will be skipped where as break will break the entire loop

***Imp:***

Continue break or pass must be used only inside the loops

If there is conditional part along with the loop we can't use continue break or pass inside the conditional part

### ***QUESTIONS***

 check for leap year year

if divisible by 4 check if divisible by 100 check if divisible by 400 if satisfies all conditions then LEAP YEAR

year=int(input())

if year%4==0:

if year%100==0:

if year%400==0:

print("leap year")

else:

print("not leap")

else:

print(" leap")

else:

print("not leap")

 prime number

prime number is a number which is divisible by itself and 1

ex: 17

17 must not be divisible by any number b/w 117 range starts from 2 because 1 is divisible by all numbers

n=int(input())

for i in range(2,n): #(2,n//2)

if n%i==0:

print("not prime")

else:

print("prime")

\*using flag:

n=int(input())

flag=0

for i in range(2,n):

if n%i==0:

flag=1

break

if flag==1:

print("not prime")

else:

print("prime")

 Greatest common divisor(GCD) min()- determines the smallest number b/w a and b

g- will be the least gcd i.e.1 because 1 is a divisor for all numbers and will iterate to i range lies b/w 1 and smallest number in all cases

ex: 12  1 2 3 4 6 12 36  1 2 3 6 9 12 18 36

ans=12

a=int(input())

b=int(input())

m=min(a,b)

g=1

for i in range(1,m+1):

if a%i==0 and b%i==0:

g=i

print(g)

 Least Common Multiple(LCM)

\*max()

\*g not equal to 1 but bigger number

\*limit starts from max no because bigger no can be multiple of small but not vice versa ex: 6 is multiple of 3 3 is not multiple of 6

a=int(input())

b=int(input())

m=max(a,b)

g=m

for i in range(m,(a\*b)+1):

if i%a==0 and i%b==0:

g=i

break

print(g)

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 Find reverse of a number ex: n=1234

→rev=0 stores the result

→divide 1234 by 10 to get remainder as 4 and store it in rem rem=n%10

→rev=rev\*10+rem

→then update the n from 1234 to123 then 12 then 1 so on n=n//10 this will give us 123.4 but as we used // we ignore the decimal part

n=int(input())

rev=0

while n>0: #while n!=0

rem=n%10

rev=rev\*10+rem

n=n//10

print(rev)

 Find multiplication of all the digits in a number

n=int(input())

rev=1

while n>0:

rem=n%10

rev=rev\*rem

n=n//10

print(rev)

#ans will be multiplication of all numbers

 Find the addition of all the digits in a number

n=int(input())

rev=0

while n>0:

rem=n%10

rev=rev+rem

n=n//10

print(rev)

#ans will be addition of all numbers

 Find if a number is palindrome or not

Palindrome is a number read same forward and backward

→store the number in different variable as n will be updated and end value will be 0

→so to compare it with the reverse number we need the original value so store n in m

n=int(input())

m=n

rev=0

while n>0:

rem=n%10

rev=rev\*10+rem

n=n//10

if m==rev:

print("palindrome")

else:

print("not palindrome")

 Find the number of digits in a number

n=int(input())

r=0

while n>0:

r=r+1

n=n//10

print(r)

 Find number of even and odd numbers

n=int(input())

even=0

odd=0

while n>0:

rem=n%10

if rem%2==0:

even=even+1

else:

odd=odd+1

n=n//10

print(even)

print(odd)

 Find factorial of a number

n=int(input())

fact=1

for i in range(1,n+1):

fact=fact\*i

print(fact)

 Find fibonacci series

1. 1 1 2 3 5 8 13 21

→assume 2 numbers 0 and 1

n=int(input())

a=0

b=1

print(a,b,end=" ")

for i in range(3,n+1):

c=a+b

print(c ,end=" ")

a=b

b=c

 PATTERNS 20

1.

n=int(input())

for i in range(0,n):

for j in range(1,n+1):

print(j,end=" ")

print()

o/p: 1 2 3

1. 2 3

1 2 3 

n=int(input())

for i in range(0,n):

for j in range(1,n+1):

print(j\*2-1,end=" ")

print()

o/p:

1 3 5

1 3 5

1 3 5 

n=int(input())

for i in range(1,n+1):

for j in range(i,n+i):

print(j,end=" ")

print()

o/p: 1 2 3 2 3 4 3 4 5 

n=int(input())

for i in range(0,n):

for j in range(i,n+i):

print(chr(65+j),end=" ")

print()

o/p:

A B C B C D

C D E



n=int(input())

for i in range(1,n+1):

for j in range(1,i+1):

print(j,end=" ")

print()

o/p: 1

1 2

1. 2 3 

n=int(input())

for i in range(1,n+1):

for j in range(i,i+i): #(i,2\*i)

print(j,end=" ")

print()

o/p: 1

1. 3
2. 4 5 

n=int(input())

for i in range(1,n+1):

for j in range(i,2\*i):

print(j\*2-1,end=" ")

print()

o/p: 1

3 5

5 7 9



n=int(input())

for i in range(0,n):

for j in range(n,i,-1):

print(j,end=" ")

print()

o/p: 3 2 1

3 2

3



n=int(input())

for i in range(0,n):

if i==0 or i==n-1:

for j in range(1,n+1):

print("\*",end=" ")

print()

else:

for j in range(0,n):

if j==0 or j==n-1:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

o/p: \* \* \* \*

* \*
* \*
* \* \* \*



n=int(input())

for i in range(0,n):

if i==0 or i==n-1 or i==n-1 or i==n-2:

for j in range(1,n+1):

print("\*",end=" ")

print()

else:

for j in range(0,n):

if j==0 or j==1 or j==n-1 or j==n-2 :

print("\*",end=" ")

else:

print(" ",end=" ")

print()

o/p: \* \* \* \* \* \* \* \* \*



n=int(input())

for i in range(n):

if i==0 or i==n-1:

for j in range(n):

print("\*",end=" ")

print()

elif i==n//2:

for j in range(n):

if j==0 or j==n//2 or j==n-1:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

else:

for j in range(n):

if j==0 or j==n-1:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

o/p:

5

* \* \* \* \*
* \*
* \* \*
* \*
* \* \* \* \*

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n=int(input())

for i in range(1,n+1):

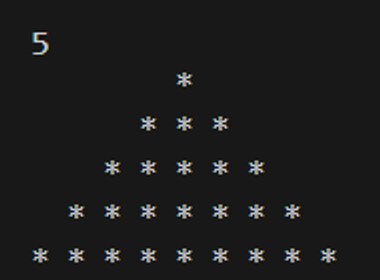
for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()





n=int(input())

for i in range(n,0,-1):

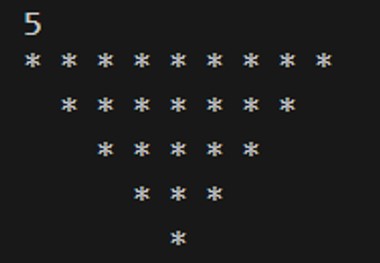
for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()





n=int(input())

for i in range(1,n+1):

if i==1 or i==n:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

else:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

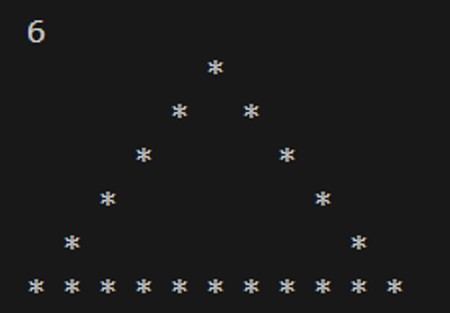
if j==0 or j==2\*i-2:

print("\*",end=" ")

else:

print(" ",end=" ")

print()





n=int(input())

for i in range(n,0,-1):

if i==0 or i==n:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

else:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

if j==0 or j==2\*i-2:

print("\*",end=" ")

else:

print(" ",end=" ")

print()





n=int(input())

for i in range(1,n+1):

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

for i in range(n-1,0,-1):

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()





n=int(input())

for i in range(1,n+1):

if i==1:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

else:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

if j==0 or j==2\*i-2:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

for i in range(n-1,0,-1):

if i==1:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

else:

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

if j==0 or j==2\*i-2:

print("\*",end=" ")

else:

print(" ",end=" ")

print()





n=int(input())

for i in range(1,n+1):

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

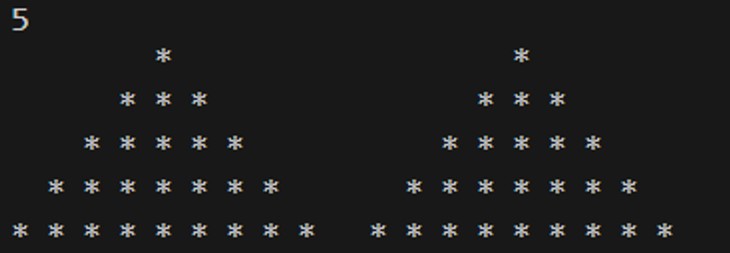
for j in range(1,(n-i+1)\*2):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()





n=int(input())

for i in range(1,n+1):

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

for j in range(1,(n-i+1)\*2):

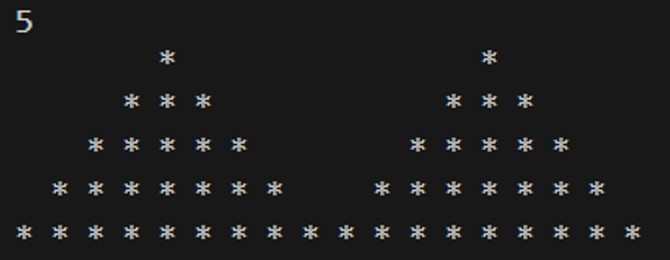
if j!=(n-i+1)\*2-1:

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()



 program to print heart

n=int(input())

for i in range(1,n+1):

for j in range(1,n-i+1):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

for j in range(1,(n-i+1)\*2):

if j!=(n-i+1)\*2-1:

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

for i in range((2\*n-1),0,-1):

for j in range(1,(2\*n)-i):

print(" ",end=" ")

for j in range(0,2\*i-1):

print("\*",end=" ")

print()

1. Program to print K

n=int(input())

for i in range(1,n+1):

for j in range(n-i+1):

if j==0 or j==n-i:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

for i in range(n,0,-1):

for j in range(n-i+1):

if j==0 or j==n-i:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

1. Program to print A

n=int(input())

for i in range(0,n):

if i==0 or i==n-1:

for j in range(1,n+1):

print("\*",end=" ")

print()

else:

for j in range(0,n):

if j==0:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

for i in range(1,n):

for j in range(0,n):

if j==0 or j==n-1:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

1. program to print s

n=int(input())

for i in range(0,n):

if i==0 or i==n-1:

for j in range(1,n+1):

print("\*",end=" ")

print()

else:

for j in range(0,n):

if j==0:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

for i in range(1,n):

for j in range(0,n):

if j==n-1:

print("\*",end=" ")

elif i==n-1:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

1. program to print T

n=int(input())

for i in range(0,n):

if i==0:

for j in range(1,n+1):

print("\*",end=" ")

print()

else:

for j in range(0,n):

if j==n//2:

print("\*",end=" ")

else:

print(" ",end=" ")

print()

## FUNCTION

set of instructions that perform particular task 3 aspects of function are:

 definition

 call

 no declaration SYNTAX def function\_name(): example:

def addition():

a=3

b=8

c=a+b

print(c)

4 TYPES

1. **with parameters and with return values:**

def addition(a,b):

c=a+b

return c

addition(5,6)

1. **with parameters and with no return values:**

def addition(a,b):

c=a+b

print(c)

addition(5,6)

1. **without parameters and with return values:**

def addition():

a=4

b=9

c=a+b

return c

print(addition(c))

1. **without parameters and without return values:**

def addition():

a=4

b=9

c=a+b

print(c)

addition()

# LIST

reversing a list: 2 ways)

i)

l=[1,2,3,4,5 print(::1) { reversing a list by slicing} ii)

l=[1,2,3,4,5 for i in range( len (l)-1,1,1 print(l[i])

1. maximum:

l=[10,3,9,1,0,5,60]

m=l[0]

for i in l:

if i>m:

m=i

print(m)

or

l=[10,3,9,1,0,5,60]

m=l[0]

for i in range(len(l)):

if l[i]>m:

m=l[i]

print(m)

1. minimum:

l=[10,3,9,1,0,5,60]

m=l[0]

for i in range(len(l)):

if l[i]<m:

m=l[i]

print(m)

or

l=[10,3,9,1,0,5,60]

m=l[0]

for i in l:

if i<m:

m=i print(m)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| -ve indexing |  |  |  |  |  |
| 6 | 5 | 4 | 3 | 2 | 1 |
| 10 | 3 | 0 | 8 | 11 | 1 |
| 0 | 1 | 2 | 3 | 4 | 5 |
| +ve indexing |  |  |  |  |  |

#finding the second largest from the list

l=[10,3,9,1,0,5,60] p=set(l) #set will sort the elements in the list q=list(p) #as negative indexing can't be done in set we will convert it in print(q[-2]) #using negative indexing we will find the second largest numb

#finding the second smallest from the list

l=[10,3,9,1,0,5,60]

p=set(l) #set will sort the elements in the list

q=list(p)

print(q[1]) #using positive indexing we will find the second largest numbe

#finding the index value of the 2 numbers which is equal to the target by adding the contents of the list:

nums=[1,4,2,6,3,5]

target=6

def addtwo(nums,target):

a=[]

for i in range(len(nums)):

for j in range(i+1,len(nums)):

if nums[i]+nums[j]==target:

a.append(i)

a.append(j)

return a

print(addtwo(nums,target))

o/p: 0,5

#finding the index value of the 3 numbers which is equal to the target by adding the contents of the list:

nums=[1,4,2,6,3,5]

target=12

def addthree(nums,target):

a=[]

for i in range(len(nums)):

for j in range(i+1,len(nums)):

for k in range(j+1,len(nums)):

if nums[i]+nums[j]+nums[k]==target:

a.append(i)

a.append(j)

a.append(k)

return a

print(addthree(nums,target))

o/p: 0,3,5

#remove duplicates from the list( without using set)

l=[1,1,1,2,2,3,3,4]

m=[]

for i in l:

if i not in m:

m.append(i) print(m)

o/p: 1,2,3,4

OR

l=[1,1,1,2,2,3,3,4]

m=[]

for i in l:

if i in m:

pass

else:

m.append(i)

print(m)

#remove duplicates from string

s="aaaabbbcd"

s1=[]

for i in s:

if i in s1:

pass

else:

s1.append(i)

print(s1)

o/p:

[ʼaʼ,ʼbʼ,ʼcʼ,ʼdʼ]

#counting how many times each letter is repeated in a string

s="aaaabbbcd"

s1=set(s)

for i in s1:

count=0

for j in s:

if i==j:

count+=1

print(i,"-",count)

o/p: d-1 c-1 b-3 a-4

#counting how many times each number is repeated in a string

l=[1,3,2,4,1,3,2,2,1,4]

l1=set(l)

for i in l1:

c=0

for j in l:

if i==j:

c+=1

print(i,"-",c)

o/p: 13

23 32

42

#sum of all even and odd numbers in list

l=[1,2,3,4,5,6,7,8]

even=0

odd=0

for i in l:

if i%2==0:

even+=i

else:

odd+=i

print("even sum=",even) print("odd sum=",odd)

even sum=20 odd sum=16

#finding common elements from the list

l1=[1,3,2,4,5]

l2=[4,6,7,8,9]

l=[]

for i in l1:

for j in l2:

if i==j:

l.append(i)

print(l)

OR

l1=[1,3,2,4,5]

l2=[4,6,7,8,9]

l=[]

for i in l1:

if i in l2:

l.append(i)

print(l)

#finding uncommon elements in the list

l1=[1,3,2,4,5]

l2=[4,6,7,8,9]

l=[]

for i in l1:

if i not in l2:

l.append(i)

for i in l2:

if i not in l1:

l.append(i)

print(l)

o/p:

1,3,2,5,6,7,8,9

#finding prime numbers from the list

def isprime(x):

for i in range(2,x//2+1):

if x%i==0:

return 0

else:

return 1

l=int(input())

u=int(input())

for i in range(l,u+1):

a=isprime(i)

if a==1:

print(i)

#converting decimal to binary

n=int(input())

b=""

while n>0:

rem=n%2

b=b+str(rem)

n=n//2

print(b[::-1])

o/p: 10

1010

#check if a number is a perfect square

n=int(input())

i=1

while i\*i<n:

i+=1

if i\*i==n:

print("perfect")

else:

print("not perfect square")

o/p:

6

not perfect square

#check if a number is a power of two

n=int(input())

i=1

while 2\*\*i<n:

i+=1

if 2\*\*i==n:

print(i)

else:

print("not power of 2")

o/p:

5

not power of 2

8 3

#check if a number is Armstrong number

Armstrong number is a number when each digit of the number powered to the length of the number and added together gives the same number ex: 371

3^37^31^3371

\*first find the length of the number i.e. c

\*a is to store the result

\*the original number is stored in m as itʼll be reduced in n=n//10

\*later m is compared with a if it is equal then prints Armstrong or else not

n=int(input())

c=len(str(n))

a=0

m=n

while n>0:

a=a+((n%10)\*\*c)

n=n//10

if a==m:

print("armstrong")

else:

print("not armstrong")

#check whether a number is a perfect number

If sum of the divisors of the given number is less than that of the given number, then that number is called as perfect number

If sum of the divisors of the given number is less than that of the given number, then that

number is called as perfect number

n=int(input())

m=n

sum=0

i=1

while i<n: #for i in range(1,n):

if n%i==0:

sum=sum+i

i+=1

if sum==m:

print("perfect number")

else:

print("not perfect number")

o/p:

6 perfect number

8

not a perfect number

#check whether the number is abundant number

If the sum of all the divisors of the given number if greater than the number itself. Then that number is called as abundant number

n=int(input())

sum=0

i=1

while i<n: #for i in range(1,n):

if n%i==0:

sum=sum+i

i+=1

if sum>n:

print("abundant number")

else:

print("not abundant number")

o/p: 12 abundant number 6 not abundant number

**STRINGS:**

***converting a list into string***:

→split(ˮ “) is used to convert a string into list

→it separates the words in a string with spaces into each element in a list.

→join() is used to convert all the elements of the list into string.

→var=ˮˮ.join(name of var to be converted) ex1

s="hey you are idiot"

l=list(s.split(" "))

l=(l[::-1])

s=" ".join(l)

print(s)

ex2

s="hey you are idiot"

l=list(s.split(" "))

s=""

for i in l:

s=s+i[::-1]+" "

print(s)

'''o/p:

yeh ouy era toidi'''

#checking if a word is palindrome or not

s="Madam"

s1=s.upper()

if s1==s1[::-1]:

print("palindrome")

else:

print("not palindrome")

'''o/p:

palindrome'''

#check whether the given word is anagram or not

a=input()

b=input()

s1=set(a) #to get the unique elements of a

s2=set(b)

if s1==s2: #checks whether the unique elements are same, if they're

for i in s1: #to run the unique elements'''

if a.count(i)!=b.count(i):

print("not anagram")

break

else:

print("anagram")

'''o/p:

dog

god

anagram'''

**RECURSION:**

a function which calls itself repeatedly until certain condition is satisfied is called as recursive function.

This process is called as ***recursion*** difference between recursion and loop is:

→a loop will run infinitely

→but by default recursion runs for 0999 times a function recurs based on the limit given for recurring. ex:

def recur(x): print(x) x+=1 recur(x)

recur() rules for writing recursive func:(format)

 define function

 base condition must be given (in 4 to 1, 1 is base condition:1 to 4, 4 is base condition  call the function again

#factorial of a number

def fact(n):

if n==1:

return n

else:

return n\*fact(n-1)

x=int(input())

print(fact(x))

#reverse of a number using recursion

def reverse(x,res):

if x<=0:

return res

else:

rem=x%10

res=res\*10+rem

return reverse(x//10,res)

return rev

n=int(input())

rem=0

res=0

print(reverse(n,res))

#Fibonacci series using recursion

def fib(n):

if n<=1:

return n

else:

return fib(n-1)+fib(n-2)

x=int(input())

print(fib(x))

**OOPS!**

Class:

a=[] print(type(a)) o/p:

<class ‘listʼ>

In python, everything will viewed in the form of class and objects.

List is stored in different locations even if the contents of list are same, because list is mutable and list is viewed as object

And if we check the id of the contents of 2 lists then itʼll be stored in the same location as the contents of list canʼt be changed.

CLASS is a user-defined datatype.

There are few in-built classes such as list, tuple and dictionary. Whenever we refer class, we refer collectively maybe animals ,students, places etc.

When we refer an object, we refer a particular thing maybe a personʼs name, animals name etc.

Attributes and Behavior:

attributes: variables. Behavior: functions.

collectively writing attributes and behavior forms class.

how to define class: class class\_name:

ex:

def \_\_init \_\_(self,x,y,z): { self is object, create a constructor and initialize 3 values which will be initialized below} self.nickname=x self.rollno=y self.height=z def run(self):

print(ˮi can runˮ, self.height, self.roll) { self is object that we are passing}

harsha=person(ˮchintuˮ,78,6 {person() is a constructor) anjali=person(ˮmaryˮ,89,5.6 harsha.run() anjali.run()

o/p:

i can run chintu 78 i can run mary 89

#if we donʼt create a constructor the contents will be common for all the objects.

constructor will initialize objects that are created.

difference between function and method:

method is also a function which is written inside a class method is accessed using objects where function is directly accessed

***Abstraction:***

itʼs an idea which is not implemented. it is used to hide the unnecessary data and show only necessary data.

in python logically abstraction, polymorphism and encapsulation does not work.

***abstract method:*** it is a method which doesnʼt contain any body.

class person:

def mobile():

pass

'''abstraction'''

class mobile: #abstract class

def functions(self): #abstract method

pass

class iphone: #class

def functions(self):

print("This is iphone")

class samsung:

def functions(self):

print("This is samsung")

iphone13=iphone()

iphone13.functions()

samsungs3=samsung()

samsungs3.functions()

## #polymorphism

class mobile: #abstract class

def functions(self): #abstract method pass

def functions(self,camera,display,battery):

self.camera=camera self.display=display self.battery=battery print(self.camera) print(self.display) print(self.battery)

iphone=mobile() iphone.functions(ˮ12mpˮ,ˮ4kˮ,ˮ60mhˮ) samsung=mobile() samsung.functions(ˮ24mpˮ,ˮ6kˮ,ˮ80mhˮ) ***abstract class:***

it is a class that contain abstract method.

#inheritance:

class mobile: #abstract class

def functions(self): #abstract method

pass

class iphone(mobile): '''passing the idea'''

def functions(self):

print("This is iphone")

class samsung(mmobile):

def functions(self):

print("This is samsung")

iphone13=iphone()

iphone13.functions()

samsungs3=samsung()

samsungs3.functions()

**Encapsulation:**

if anything is private we cant access them directly instead we access then using methods.ˮ “\_ˮ =private variables. “\_\_ˮ=protected variables. in python we can change the private variables using a public variable(loophole)

class car:

\_engine="v8"

\_wires="blue"

bmw=car()

bmw.\_engine="v9"

encapsulation can be implemented using getter and setter methods methods are always public variables can be either private, protected or public

class car:

\_engine="v8"

\_wires="blue"

def getter(self):

print(self.\_engine)

print(self.\_wires)

def setter(self,engine,wires):

self.\_engine=engine

self.\_wires=wires

bmw=car()

bmw.setter("v9","red")

bmw.getter()

class person:

def \_\_init\_\_(self,x,y,z): #self is object, create a cons

self.nickname=x

self.rollno=y

self.height=z

def run(self):

print("i can run",self.height, self.roll) #{ self is o

harsha=person("chintu",78,6) #{person()

anjali=person("mary",89,5.6)

harsha.run()

anjali.run()

**Inheritance:**

 single

 multiple

 multilevel

 hierarchical

 hybrid

## 1. single

inheriting from one single class

class parents:

def coolness(self):

print("parents are cool")

class child(parents):

def coding(self):

print("i know coding")

yashu=child()

yashu.coolness()

yashu.coding()

##  multilevel

a class(child2 is inherited from another class(child) but that class(child) is inherited from its parent class(parents)

class parents:

def coolness(self):

print("parents are cool")

class child(parents):

def coding(self):

print("i know coding")

class child2(child):

def singing(self):

print("i can sing")

yashu=child2()

yashu.coolness()

yashu.coding()

yashu.singing()

3.multiple:

a child will inherit from 2 parents

class dad:

def coolness(self):

print("parents are cool")

class mom:

def coding(self):

print("i know coding")

class child(dad,mom):

def singing(self):

print("i can sing")

yashu=child()

yashu.coolness()

yashu.coding()

yashu.singing()

 hierarchical:

class grandfather:

def coolness(self):

print("parents are cool")

class father(grandfather):

def coding(self):

print("i know coding")

class daughter(father):

def singing(self):

print("i can sing")

yashu=daughter()

yashu.coolness()

yashu.coding()

yashu.singing()

 hybrid:

class grandfather:

def coolness(self):

print("i'm cool")

class father(grandfather):

def coding(self):

print("i know coding")

class mother(grandfather):

def cooking(self):

print("i can cook")

class daughter(father,mother):

def singing(self):

print("i can sing")

yashu=daughter()

yashu.coolness()

yashu.coding()

yashu.cooking()

yashu.singing()

**Polymorphism:**

poly: many morphism: forms ***overloading:*** same name and different parameters.

class add:

def sum(self,x,y):

print(x+y)

def sum(self,x,y,z):

print(x+y+z)

i=add()

i.sum(10,8)

i.sum(10,8,1)

o/p: error

class add:

def sum(self,x,y):

print(x+y)

class child(add):

def sum(self,x,y,z):

print(x+y+z)

i=add()

i.sum(10,8)

o/p: 18 ***overriding:***

**DATA STRUCTRES!**

Use:

It reduces time and space complexity.

## LINEAR SEARCH

searching the value one by one. it requires more time.

l=[1,2,3,4,5,6,7,8,9,10]

for i in l:

if i==7:

print("found")

break

else:

print("not found")

## BINARY SEARCH

→use 2 pointers to search

→one pointing to first number(left) - increment it i=0 #left=0

→another to the last one(right) - decrement it

\*for loop : when we know how many times to run it

\*while loop : we do not know how many times but know the condition

\*when we use elif : only one condition will run

\*when we use multiple if : all conditions will run

l=[1,17,3,4,10,8,12,22]

l.sort()

print(l)

s=8

i=0

j=len(l)-1

while i<j:

mid=i+j//2

if l[mid]==s:

print(mid,"found")

break

elif l[mid]>s:

j=mid-1

else:

i=mid+1

else:

print("not found")

## TIME COMPLEXITY

 Best O1 searching in the first and getting the first value.

 average [O(n)] it depends the value of n

 Worst [O(n)] only one loop is used

***SPACE COMPLEXITY O1*** memory space will be fixed.

O(log(n)):

is used when the size is decreasing by half. n is number of elements.

## SORTING

the 5 sorting techniques are:

 bubble

 merge

 quick

 selection

 insert

###  BUBBLE SORT

best case scenario for sorting is when the list of elements are already sorted. the greater number will move to the last

l=[9,7,78,10,5,1,0]

for i in range(0,len(l)-1):

for j in range(0,len(l)-i-1):

if l[j]>l[j+1]:

l[j],l[j+1]=l[j+1],l[j] #swap {a,b=b,a}

print(l)

###  SELECTION SORT

b=[2,6,8,4,19,5,44]

for i in range(0,len(b)-1):

m=i

for j in range(i+1,len(b)):

if b[m]>=b[j]:

m=j

b[i],b[m]=b[m],b[i]

print(b)

###  INSERTION SORT

→always starts with second number while sorting:

→the sorted array will be on left(backward)

→unsorted array will be on right(forward) ⇒i will be all the forward elements

⇒j will be all the backward elements

b=[2,6,8,4,19,5,44]

for i in range(1,len(b)):

j=i-1

a=b[i]

while j>=0 and b[j]>a:

b[j+1]=b[j]

j-=1

b[j+1]=a

print(b)

###  MERGE SORT

works on divide and conquer rule.

→break the given array by dividing it until we get a singular element this is done by using the condition beginning<ending (base condition)

#merge sort

def merge(arr,mid,beg,end):

n1=mid-beg+1

n2=end-mid

i=j=0

left=arr[beg:mid+1]

right=arr[mid+1:end+1]

k=beg

while i<n1 and j<n2:

if left[i]<right[j]:

arr[k]=left[i]

i+=1

else:

arr[k]=right[j]

j+=1

k+=1

while i<n1:

arr[k]=left[i]

k+=1

i+=1

while j<n2:

arr[k]=right[j]

k+=1

j+=1

###  QUICK SORT

it is the most effective sorting technique.

follows 2 pointer approach (start and end pointers)

def partition(arr,low,high):

pivot=arr[low]

start=low+1

end=high

while True:

while start<=end and arr[start]<=pivot:

start+=1

while start<=end and arr[end]>pivot:

end-=1

if start<end:

arr[start],arr[end]=arr[end],arr[start]

else:

break

arr[low],arr[end]=arr[end],arr[low]

return end

def quicksort(arr,beg,end):

if beg<end:

p=partition(arr,beg,end)

quicksort(arr,beg,p-1)

quicksort(arr,p+1,end)

a=[8,7,6,1,4,5,2,3]

b=0

e=len(a)-1

quicksort(a,b,e)

print(a)

## STACKS AND QUEUES STACKS

stacks and queues can be implemented using list. stacks and queues are implemented using oops concept.

for implementing stack we should create a class and inside a class constructor is used. terminologies for implementing stack:

push, pop, and peek(topmost element of stack) code for implementing stack:

class stack:

def \_\_init\_\_(self):

self.top=-1 #top value can also be given using negative

self.size=5 #just like how we give MAX in C

self.list=[]

def push(self,a):

if len(self.list)>=5:

print("list is full")

return 0

self.top+=1

self.list.append(a)

def pop(self):

if len(self.list)==0:

print("list is empty")

return 0

self.top-=1

def peek(self):

print(self.list)

if len(self.list)==0:

print("list is empty")

return 0

elif self.top>5:

print("out of index")

else:

print(self.list[self.top])

s=stack()

s.push(1)

s.push(2)

s.push(3)

s.push(4)

s.peek()

s.pop()

s.peek()

s.pop()

s.peek()

QUEUES

class queue:

def \_\_init\_\_(self):

self.front=-1 #top value can also be given using negativ

self.rear=-1

self.size=5 #just like how we give MAX in C.

self.list=[]

def enqueue(self,a):

if len(self.list)>=5:

print("list is full")

return 0

self.rear+=1

self.list.append(a)

if self.front==-1:

self.front=0

def dequeue(self):

if len(self.list)==0:

print("list is empty")

return 0

elif self.front>self.rear:

print("list is empty")

else:

self.list.pop(0)

self.front+=1

print(self.list)

def display(self):

print(self.list)

if len(self.list)==0:

print("list is empty")

return 0

s=queue()

s.enqueue(1)

s.enqueue(2)

s.enqueue(3)

s.enqueue(4)

s.enqueue(5)

s.display()

s.dequeue()

s.dequeue()

s.dequeue()

s.dequeue()

s.dequeue()

#evaluation of postfix expression:

s="5678+-\*"

s1=[]

for i in s:

if i.isdigit():

s1.append(int(i))

else:

op2=s1.pop()

op1=s1.pop()

if i=="+":

s1.append(op1+op2)

elif i=="-":

s1.append(op2-op1)

elif i=="\*":

s1.append(op1\*op2)

elif i=="/":

s1.append(op1/op2)

print(s1)

#Implement queue using stack:

in queue we delete elements from 0th index but in stack we delete from the top.

l=[1,2,3,4]

s=[]

def pop():

for i in range(len(l)):

s.append(l.pop())

s.pop()

for i in range(len(s)):

l.append(s.pop())

pop()

pop()

print(l)

OR

class MyQueue:

def \_\_init\_\_(self):

self.s1=[]

self.s2=[]

def push(self, x: int) -> None:

self.s1.append(x)

def pop(self) -> int:

for i in range(len(self.s1)):

self.s2.append(self.s1.pop())

a=self.s2.pop()

for i in range(len(self.s2)):

self.s1.append(self.s2.pop())

return a

def peek(self) -> int:

return self.s1[0]

def empty(self) -> bool:

return len(self.s1)==0

**LINKED LIST:**

Linked lists: why linked list when there is set, list etc.?

 time complexity

 space complexity linked list is represented by nodes node contains 2 sections:

 data section

 address section(address of next node)

### #insert beginning and delete beginning

class Node:

def \_init\_(self,v):

self.data=v

self.next=None #NULL

#make sure u understand each and every line sowmyaa!!!!

class linkedlist:

def \_init\_(self):

self.head=None

def insertbeg(self,v):

nn=Node(v)

if self.head==None:

self.head=nn

else:

nn.next=self.head

self.head=nn

def delbeg(self):

if self.head==None:

print("list empty")

else:

temp=self.head

self.head=temp.next

def display(self):

curr=self.head

while curr!=None:

print(curr.data)

curr=curr.next

print("null")

l=linkedlist()

l.insertbeg(10)

l.insertbeg(2)

l.insertbeg(8)

l.display()

l.delbeg()

l.display()

### #insert end and delete end

class Node:

def \_\_init\_\_(self,v):

self.data=v

self.next=None #NULL

#make sure u understand each and every line sowmyaa!!!!

class linkedlist:

def \_\_init\_\_(self):

self.head=None

def insertend(self,v):

nn=Node(v)

if self.head==None:

self.head=nn

else:

curr=self.head

while curr.next!=None:

curr=curr.next

curr.next=nn

def delend(self):

if self.head==None:

print("list empty")

else:

curr=prev=self.head

while curr.next!=None:

prev=curr

curr=curr.next

prev.next=None

def display(self):

curr=self.head

while curr!=None:

print(curr.data,"->",end=" ")

curr=curr.next

print("null")

l=linkedlist()

l.insertend(10)

l.insertend(2)

l.insertend(8)

l.insertend(11)

l.display()

l.delend()

l.display()

### #insert anywhere and delete anywhere

class Node:

def \_init\_(self,v):

self.data=v

self.next=None #NULL

#make sure u understand each and every line sowmyaa!!!!

class linkedlist:

def \_init\_(self):

self.head=None

def insertend(self,v):

nn=Node(v)

|  |
| --- |
| if self.head==None: self.head=nn else:  curr=self.head while curr.next!=None:  curr=curr.next curr.next=nn def insertany(self,v,k):  nn=Node(v) if self.head==None:  print("list is empty") else:  curr=self.head while curr!=None: if curr.data==k: nn.next=curr.next curr.next=nn break curr=curr.next def search(self,k): curr=self.head while curr!=None: if curr.data==k: print("found") break curr=curr.next else:  print("not found") def delany(self,k): if self.head==None:  print("list empty") else:  curr=prev=self.head while curr!=None: if curr.data==k:  prev.next=curr.next |

break

prev=curr

curr=curr.next

else:

print("key not found")

def display(self):

curr=self.head

while curr!=None:

print(curr.data,"->",end=" ")

curr=curr.next

print("null")

l=linkedlist()

l.insertend(10)

l.insertend(2)

l.insertend(8)

l.insertend(11)

l.insertany(17,2)

l.display()

l.search(8)

l.delany(8)

l.display()

### #insert at middle of the list using count

class Node:

def \_\_init\_\_(self,value):

self.data=value

self.next=None

class linkedlist:

def \_\_init\_\_(self):

self.head=None

def insertatbeg(self,value):

newnode=Node(value)

if self.head==None:

self.head=newnode

else:

newnode.next=self.head

self.head=newnode

def insertmid(self,value):

newnode=Node(value)

c=0

if self.head==None:

self.head=newnode

elif self.head.next==None:

self.head.next=newnode

else:

curr=self.head

while curr!=None:

c+=1

curr=curr.next

curr=self.head

for i in range(c//2):

curr=curr.next

newnode.next=curr.next

curr.next=newnode

def printlist(self):

curr=self.head

while(curr!=None):

print(curr.data,"->",end="")

curr=curr.next

print("null")

l=linkedlist()

l.insertatbeg(1)

l.insertatbeg(2)

l.insertatbeg(3)

l.insertatbeg(8)

l.insertmid(4)

l.printlist()

### #insert at middle of the list without using count

def insertmid(self,val):

newnode=node(val)

if self.head==None:

self.head=newnode

elif self.head.next==None:

self.head.next=newnode

else:

fast=self.head

slow=self.head

while fast.next!=None and fast.next.next!=None:

fast=fast.next.next

slow=slow.next

newnode.next=slow.next

slow.next=newnode

#reverse of a linked list

**Trees:**

### #creating a node in a normal tree

class node:

def \_\_init\_\_(self,v):

self.left=None

self.right=None

self.data=v

def inorder(root):

if root:

inorder(root.left)

print(root.data)

inorder(root.right)

r=node(1)

r.left=node(2)

r.right=node(3)

r.left.left=node(4)

r.left.right=node(5)

inorder(r)

we create a function to print the contents of the tree instead of method because:

since there is no root inside node class, for traversing we need to pass root as parameter hence we create a function for traversing not a method.

**Binary search tree:**

class node:

def \_\_init\_\_(self,v):

self.left=None

self.right=None

self.data=v

class trees: #in trees root is the only variable we can have

def \_\_init\_\_(self):

self.root=None

def insert(self,value):

nn=node(value)

if self.root is None:

self.root=nn

else:

curr=self.root

while True:

if value<=curr.data:

if curr.left==None:

curr.left=nn

break

else:

curr=curr.left

else:

if curr.right==None:

curr.right=nn

break

else:

curr=curr.right

def preorder(self,root):

if root:

print(root.data)

self.preorder(root.left)

self.preorder(root.right)

def inorder(root):

if root:

inorder(root.left)

print(root.data)

inorder(root.right)

def postorder(root):

if root:

postorder(root.left)

postorder(root.right)

print(root.data)

r=trees()

r.insert(2)

r.insert(8)

r.insert(1)

r.preorder(r.root)

print(" ")

inorder(r.root)

print(" ")

postorder(r.root)

**Graphs:**

It is a non primitive no linear data structure which contains edges and vertices.

Applications of graphs:

 maps

 social media apps

### #adjacency matrix

class Graph:

def \_\_init\_\_(self):

self.matrix=[[0]\*5 for i in range(5)]

print(self.matrix)

def addvertex(self,a,b):

self.matrix[a][b]=1

def print(self):

for i in self.matrix:

print(i)

g=Graph()

g.addvertex(1,2)

g.addvertex(4,2)

g.addvertex(1,4)

g.addvertex(2,3)

g.addvertex(4,3)

g.print()

O/P

0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

0, 0, 0, 0, 0

0, 0, 1, 0, 1

0, 0, 0, 1, 0

0, 0, 0, 0, 0

0, 0, 1, 1, 0

### #adjacency list using dictionary

class Graph:

def \_\_init\_\_(self):

self.matrix={}

def addvertex(self,a,b):

if a not in self.matrix:

self.matrix[a]=[b]

else:

self.matrix[a].append(b)

def print(self):

print(self.matrix)

g=Graph()

g.addvertex(1,2)

g.addvertex(4,2)

g.addvertex(1,4)

g.addvertex(2,3)

g.addvertex(4,3)

g.print()

O/P

1 2, 4, 4 2, 3, 2 3

### #bfs

class Graph:

def \_\_init\_\_(self):

self.matrix={}

def addvertex(self,a,b):

if a not in self.matrix:

self.matrix[a]=[b]

else:

self.matrix[a].append(b)

def print(self):

print(self.matrix)

def bfs(self,data):

v=[]

q=[data]

while q:

vertex=q.pop(0)

print(vertex)

if vertex in self.matrix:

for i in self.matrix[vertex]:

if i not in v:

v.append(i)

q.append(i)

g=Graph()

g.addvertex(1,2)

g.addvertex(4,2)

g.addvertex(1,4)

g.addvertex(2,3)

g.addvertex(4,3)

g.print()

g.bfs(1)

### #dfs

class Graph:

def \_\_init\_\_(self):

self.matrix={}

def addvertex(self,a,b):

if a not in self.matrix:

self.matrix[a]=[b]

else:

self.matrix[a].append(b)

def print(self):

print(self.matrix)

def dfs(self,data):

v=[]

q=[data]

while q:

vertex=q.pop()

print(vertex)

if vertex in self.matrix:

for i in self.matrix[vertex]:

if i not in v:

v.append(i)

q.append(i)

g=Graph()

g.addvertex(1,2)

g.addvertex(4,2)

g.addvertex(1,4)

g.addvertex(2,3)

g.addvertex(4,3)

g.print()

g.dfs(1)

**LEETCODE PROBLEMS:**

810. Faulty Keyboard

class Solution:

def finalString(self, s: str) -> str:

l=""

for i in s:

if i!="i":

l+=i

else:

l=l[::-1]

return l

832. Check the given string is PANGRAM or not

class Solution:

def checkIfPangram(self, sentence: str) -> bool:

a="abcdefghijklmnopqrstuvwxyz"

for i in a:

if i not in sentence:

return False

else:

return True

557. Reverse words in a string III

class Solution:

def reverseWords(self, s: str) -> str:

a=""

l=s.split(" ")

for i in range(len(l)):

if i==len(l)-1:

a=a+l[i][::-1]

else:

a=a+l[i][::-1]+" "

return a

828. Check if a String is an Acronym or not

class Solution:

def isAcronym(self, words: List[str], s: str) -> bool:

if len(words)!=len(s):

return False

else:

for i in range(len(s)):

if s[i]!=words[i][0]:

return False

return True

804. Unique Morse Code Words

class Solution:

def uniqueMorseRepresentations(self, words: List[str]) -> in

n=[".-","-...","-.-.","-..",".","..-.","--.","....",".."

a="abcdefghijklmnopqrstuvwxyz"

p=[]

ans=[]

for q in words:

b=""

for i in q:

b+=n[a.index(i)]

p.append(b)

for q in p:

if q not in ans:

ans.append(q)

return len(ans)

315. Count Asterisks

class Solution:

def countAsterisks(self, s: str) -> int:

n=""

c=0

t=0

for i in s:

if i=="|":

t=t+1

elif t%2==0:

c+= i=="\*"

return c

744. Maximum number of String pairs

class Solution:

def maximumNumberOfStringPairs(self, words: List[str]) -> in

c=0

for i in range(len(words)):

for j in range(i+1,len(words)):

if words [i][0]==words[j][1] and words[i][1]==wo

c+=1

return c

967. Number of strings that appear as substrings

class Solution:

def maximumNumberOfStringPairs(self, words: List[str]) -> in

c=0

for i in range(len(words)):

for j in range(i+1,len(words)):

if words [i][0]==words[j][1] and words[i][1]==wo

c+=1

return c

019. Count the key Changes

class Solution:

def countKeyChanges(self, s: str) -> int:

n=s.lower()

c=0

for i in range(len(n)-1):

if n[i]!=n[i+1]:

c+=1

return c

344. Reverse String

class Solution:

def reverseString(self, s: List[str]) -> None:

s[:]=s[::-1]

110. Score of a String

class Solution:

def scoreOfString(self, s: str) -> int:

a=0

for i in range(1,len(s)):

a+=abs(ord(s[i])-ord(s[i-1]))

return a

418. Sort the People

class Solution:

def sortPeople(self, names: List[str], heights: List[int]) -

a=[]

for i in range(len(names)):

a.append([heights[i],names[i]])

a.sort(reverse=True)

b=[]

for i in range(len(names)):

b.append(a[i][1])

return b

1. Two Sum

class Solution:

def twoSum(self, nums, target):

a=[]

for i in range(len(nums)):

for j in range(i+1,len(nums)):

if nums[i]+nums[j]==target:

a.append(i)

a.append(j)

return a

return(twosum(nums,target))

58. Length of Last Word

class Solution:

def lengthOfLastWord(self, s: str) -> int:

l=s.split()

a=len(l[-1])

return a

859. Sorting the sentence

class Solution:

def sortSentence(self, s: str) -> str:

l=s.split(" ")

d={}

for i in l:

d[i[-1]]=i[:-1]

s=""

for i in range(1,len(l)+1):

if i==len(l):

s=s+d[str(i)]

else:

s=s+d[str(i)]+" "

return s

20. Valid Parenthesis

class Solution:

def isValid(self, s: str) -> bool:

a=[]

for i in s:

if i=="(" or i=="{" or i=="[":

a.append(i)

elif (i==")" or i=="}" or i=="]")and len(a)==0:

return False

else:

if i==")" and a[-1]=="(":

a.pop()

elif i=="}"and a[-1]=="{":

a.pop()

elif i=="]" and a[-1]=="[":

a.pop()

else:

a.append(i)

if len(a)==0:

return True

else:

return False

929. Concatenation of Array

class Solution:

def getConcatenation(self, nums: List[int]) -> List[int]:

return 2\*nums

470. Shuffle the Array

class Solution:

def shuffle(self, nums: List[int], n: int) -> List[int]:

n=[]

h=len(nums)//2

for i in range(len(nums)//2):

n.append(nums[i])

n.append(nums[i + h])

return n

672. Richest Customer Wealth

class Solution:

def maximumWealth(self, accounts: List[List[int]]) -> int:

maxw=0

for i in range(len(accounts)):

t=sum(accounts[i])

maxw=max(maxw,t)

return maxw

798. Number of employees who met the target

class Solution:

def numberOfEmployeesWhoMetTarget(self, hours: List[int], ta

c=0

for i in hours:

if i>=target:

c+=1

return c

431. Kids with Greatest number of candies

class Solution:

def kidsWithCandies(self, candies: List[int], extraCandies:

maximum=max(candies)

r=[]

for i in range(len(candies)):

t=candies[i]+extraCandies

r.append(t>=maximum)

return r

824. Count pairs whose sum is less than target

class Solution:

def countPairs(self, nums: List[int], target: int) -> int:

c=0

for i in range(len(nums)):

for j in range(i+1,len(nums)):

if nums[i]+nums[j]<target:

c+=1

return c

480. Running Sum of 1D Array

class Solution:

def runningSum(self, nums: List[int]) -> List[int]:

for i in range(1,len(nums)):

nums[i]+=nums[i-1]

return nums

974. Minimum number game

class Solution:

def numberGame(self, nums: List[int]) -> List[int]:

nums=sorted(nums)

for i in range(0,len(nums),2):

nums[i],nums[i+1]=nums[i+1],nums[i]

return nums

588. Sum of Odd Length Subarrays

class Solution:

def sumOddLengthSubarrays(self, arr: List[int]) -> int:

r=0

for i in range(len(arr)):

for j in range(i,len(arr),2):

r+=sum(arr[i:j+1])

return r

232. Implement Queue using Stack

class MyQueue:

def \_\_init\_\_(self):

self.s1=[]

self.s2=[]

def push(self, x: int) -> None:

self.s1.append(x)

def pop(self) -> int:

for i in range(len(self.s1)):

self.s2.append(self.s1.pop())

a= self.s2.pop()

for i in range(len(self.s2)):

self.s1.append(self.s2.pop())

return a

def peek(self) -> int:

return self.s1[0]

def empty(self) -> bool:

if len(self.s1)==0:

return True

else:

return False

225. Implement of Stack using Queues

class MyStack:

def \_\_init\_\_(self):

self.q1=[]

self.q2=[]

def push(self, x: int) -> None:

self.q1.append(x)

def pop(self) -> int:

for i in range(len(self.q1)):

self.q2.append(self.q1.pop())

a=self.q2.pop(0)

for i in range(len(self.q2)):

self.q1.append(self.q2.pop())

return a

def top(self):

return self.q1[-1]

def empty(self):

if len(self.q1)==0:

return True

else:

return False

26. Remove Duplicates from the Sorted Array

class Solution:

def removeDuplicates(self, nums: List[int]) -> int:

s=set(nums)

l=list(s)

l.sort()

for i in range(len(l)):

nums[i]=l[i]

return len(l)

58. Length of Last Word

class Solution:

def lengthOfLastWord(self, s: str) -> int:

c=0

i=len(s)-1

while i>=0 and s[i]==' ':

i-=1

while i>=0 and s[i]!=' ':

c+=1

i-=1

return c

242. Valid Anagram

class Solution:

def isAnagram(self, s: str, t: str) -> bool:

sorted\_s=sorted(s)

sorted\_t=sorted(t)

return sorted\_s==sorted\_t

258. Add Digits

class Solution:

def addDigits(self, num: int) -> int:

if num>=10:

output=num//10+num%10

if output<10:

return output

else:

return self.addDigits(output)

else:

return num

876. Middle of the Linked List

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, val=0, next=None):

# self.val = val

# self.next = next

class Solution:

def middleNode(self, head: Optional[ListNode]) -> Optional[L

temp=head

c=0

while temp!=None:

c+=1

temp=temp.next

temp=head

for i in range(c//2):

temp=temp.next

return temp

206. Reverse Linked List

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, val=0, next=None):

# self.val = val

# self.next = next

class Solution:

def reverseList(self, head: Optional[ListNode]) -> Optional

prev=None

next=None

curr=head

while curr!=None:

next=curr.next

curr.next=prev

prev=curr

curr=next

head=prev

return head

21. Merge Two Sorted Lists

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, val=0, next=None):

# self.val = val

# self.next = next

|  |
| --- |
| class Solution:  def mergeTwoLists(self, list1: Optional[ListNode], list2: Op curr1=list1 curr2=list2 curr3=None while curr1!=None and curr2!=None: if curr1.val<=curr2.val:  newnode=ListNode(curr1.val) temp=curr3 if temp==None: curr3=newnode else: while (temp.next!=None):  temp=temp.next temp.next=newnode curr1=curr1.next else:  newnode=ListNode(curr2.val) temp=curr3 if temp==None: curr3=newnode else: while temp.next!=None:  temp=temp.next temp.next=newnode curr2=curr2.next while curr1!=None:  newnode=ListNode(curr1.val) temp=curr3 if temp==None: curr3=newnode else: while temp.next!=None:  temp=temp.next temp.next=newnode curr1=curr1.next |

while curr2!=None:

newnode=ListNode(curr2.val)

temp=curr3

if temp==None:

curr3=newnode

else:

while temp.next!=None:

temp=temp.next

temp.next=newnode

curr2=curr2.next

return curr3

160. Intersection Of Two Linked Lists

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, x):

# self.val = x

# self.next = None

class Solution:

def getIntersectionNode(self, headA: ListNode, headB: ListNo

a=headA

b=headB

c=0

while a!=b:

a=a.next

b=b.next

if a==None:

a=headB

c+=1

if b==None:

b=headA

c+=1

if c>=3:

return None

return b

234. Palindrome Linked List

# Definition for singly-linked list.

# class ListNode:

# def \_init\_(self, val=0, next=None):

# self.val = val

# self.next = next

class Solution:

def isPalindrome(self, head: Optional[ListNode]) -> bool:

curr=head

newnode=ListNode(curr.val)

a=newnode

curr=curr.next

while curr!=None:

new=ListNode(curr.val)

a.next=new

curr=curr.next

a=a.next

prev=None

next=None

curr=head

while curr!=None:

next=curr.next

curr.next=prev

prev=curr

curr=next

head=prev

curr=head

a=newnode

while curr!=None:

if curr.val!=a.val:

return False

curr=curr.next

a=a.next

else:

return True

83. Remove Duplicates From the List

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, val=0, next=None):

# self.val = val

# self.next = next

class Solution:

def deleteDuplicates(self, head: Optional[ListNode]) -> Opti

curr=head

next=None

if head==None:

return None

while curr.next!=None:

next=curr.next

if curr.val!=next.val:

curr=curr.next

else:

curr.next=next.next

return head

141. Linked List Cycle

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, x):

# self.val = x

# self.next = None

class Solution:

def hasCycle(self, head: Optional[ListNode]) -> bool:

if head==None:

return False

fast=head

slow=head

while fast.next!=None and fast.next.next!=None:

fast=fast.next.next

slow=slow.next

if fast==slow:

return True

return False

203. Remove Linked List Elements

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, val=0, next=None):

# self.val = val

# self.next = next

class Solution:

def removeElements(self, head: Optional[ListNode], val: int)

temp=ListNode

curr=temp

temp.next=head

while curr.next!=None:

if curr.next.val==val:

curr.next=curr.next.next

else:

curr=curr.next

return temp.next

237. Delete Node in a Linked List

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, x):

# self.val = x

# self.next = None

class Solution:

def deleteNode(self, node):

"""

:type node: ListNode

:rtype: void Do not return anything, modify node in-plac

"""

node.val=node.next.val

node.next=node.next.next

2. Add Two Numbers

# Definition for singly-linked list.

# class ListNode:

# def \_\_init\_\_(self, val=0, next=None):

# self.val = val

# self.next = next

class Solution:

def addTwoNumbers(self, l1: Optional[ListNode], l2: Optional

s=""

s2=""

while l1!=None:

s=s+str(l1.val)

l1=l1.next

while l2!=None:

s2=s2+str(l2.val)

l2=l2.next

s=s[::-1]

s2=s2[::-1]

a=int(s)+int(s2)

a=str(a)

a=a[::-1]

q=str(a)

z=ListNode()

curr=z

for i in q:

new=ListNode(int(i))

curr.next=new

curr=curr.next

return z.next

145. Binary Tree Postorder Traversal

# Definition for a binary tree node.

# class TreeNode:

# def \_init\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left

# self.right = right

class Solution:

def postorderTraversal(self, root: Optional[TreeNode]) -> Li

s=[]

def order(root,s):

if root:

order(root.left,s)

order(root.right,s)

s.append(root.val)

order(root,s)

return s

94. Binary Tree Preorder Traversal

# Definition for a binary tree node.

# class TreeNode:

# def \_init\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left

# self.right = right

class Solution:

def preorderTraversal(self, root: Optional[TreeNode]) -> Lis

s=[]

def order(root,s):

if root:

s.append(root.val)

order(root.left,s)

order(root.right,s)

order(root,s)

return s

144. Binary Tree Inorder Traversal

# Definition for a binary tree node.

# class TreeNode:

# def \_init\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left

# self.right = right

class Solution:

def inorderTraversal(self, root: Optional[TreeNode]) -> List

s=[]

def order(root,s):

if root:

order(root.left,s)

s.append(root.val)

order(root.right,s)

order(root,s)

return s

104. Maximum Depth of Binary Tree

class Solution:

def maxDepth(self, root: Optional[TreeNode]) -> int:

def height(root):

if root:

leftnode=height(root.left)

rightnode=height(root.right)

return max(leftnode,rightnode)+1

else:

return 0

a=height(root)

return a

111. Minimum Depth of the Binary Tree

# Definition for a binary tree node.

# class TreeNode:

# def \_\_init\_\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left

# self.right = right

class Solution:

def minDepth(self, root: Optional[TreeNode]) -> int:

def height(root):

if root:

if root.left is None:

return height(root.right)+1

if root.right is None:

return height(root.left)+1

leftnode=height(root.left)

rightnode=height(root.right)

return min(leftnode,rightnode)+1

else:

return 0

a=height(root)

return a

1. Same Tree

# Definition for a binary tree node.

# class TreeNode:

# def \_\_init\_\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left

# self.right = right

class Solution:

def isSameTree(self, p: Optional[TreeNode], q: Optional[Tree

def same(p,q):

if p is None and q is None:

return True

if p is None or q is None:

return False

if p.val!=q.val:

return False

return same(p.left,q.left) and same(p.right,q.right)

return same(p,q)

1. Symmetric Tree

# Definition for a binary tree node.

# class TreeNode:

# def \_init\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left # self.right = right class Solution: def isSymmetric(self, root: Optional[TreeNode]) -> bool: def same(p,q): if p is None and q is None:

return True if p is None or q is None:

return False if p.val!=q.val: return False return (p.val==q.val) and same(p.left,q.right) a return same(root.left,root.right)

108. Convert Sorted Array to Binary Search Tree

222. Count Complete Tree Nodes

# Definition for a binary tree node.

# class TreeNode:

# def \_\_init\_\_(self, val=0, left=None, right=None):

# self.val = val

# self.left = left

# self.right = right

class Solution:

def countNodes(self, root: Optional[TreeNode]) -> int:

s=[]

def order(root,s):

if root:

order(root.left,s)

s.append(root.val)

order(root.right,s)

order(root,s)

return len(s)

1. Remove Elements

class Solution:

def removeElement(self, nums: List[int], val: int) -> int:

n=0

for i in range(len(nums)):

if nums[i]!=val:

nums[n]=nums[i]

n+=1

return n

1. Find the Index of the First Occurrence in a String

class Solution:

def strStr(self, haystack: str, needle: str) -> int:

for i in range(len(haystack)-len(needle)+1):

if haystack[i:i+len(needle)]==needle:

return i

return -1

283. Move Zeroes

class Solution:

def moveZeroes(self, nums: List[int]) -> None:

left=0

for right in range(len(nums)):

if nums[right]!=0:

nums[right],nums[left]=nums[left],nums[right]

left+=1

return nums

268. Missing Number

class Solution:

def missingNumber(self, nums: List[int]) -> int:

n=len(nums)

expected\_s=n\*(n+1)//2

actual\_s=sum(nums)

missing\_num=expected\_s-actual\_s

return missing\_num

748. Sum of Unique Elements

class Solution:

def sumOfUnique(self, nums: List[int]) -> int:

c=[]

for i in nums:

if nums.count(i)>1:

continue

else:

c.append(i)

return sum(c)

351. Count Negative Numbers in a Sorted Matrix

class Solution:

def countNegatives(self, grid: List[List[int]]) -> int:

c=0

for i in grid:

for j in i:

if j<0:

c+=1

return c

716. Minimum String Length

class Solution:

def minimizedStringLength(self, s: str) -> int:

a=""

for i in s:

if(i not in a):

a+=i

return len(a)