Maharaj Vijayaram Gajapathi Raj College of Engineering (AUTONOMOUS)

(Approved by AICTE, New Delhi and Affiliated to JNTU, Kakinada)

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CERTIFICATE

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LAB-IN-CHARGE **HEAD OF THE DEPARTMENT**

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WEEK – 1 (Input ,Print and Numbers)

Statement :

Write a program that takes three numbers and prints their sum. Every number is given on a separate line.

Objective :

To get familiar with basics of python and using it for printing sum of given 3 numbers.

Code :

```
a=int(input())
b=int(input())
c=int(input())
print(a+b+c)
```

Input :	**Output** :
2 3 6	11

Inference :

3 numbers are given through user input and sum of 3 numbers is printed.

Statement :

Write a program that greets the person by printing the word "Hi" and the name of the person. See the examples below.

Objective :

To understand basics of python and Print a name with prefix “HI”.

Code :

```
name=input()
print("Hi "+name)
```

Input :	**Output** :
John	Hi John

Inference :

When given a name, the word “HI” is displayed along with the word.

Statement :

Write a program that takes a number and print its square.

Objective :

To get familiar with basics of python and print square of a given number.

Code :

```
a=input()
print(int(a)*int(a))
```

Input :	**Output** :
5	25

Inference :

We multiply the number by itself ,thus the square of the number is printed.

Statement :

Write a program that reads the length of the base and the height of a right-angled triangle and prints the area. Every number is given on a separate line.

Objective :

To understand the basics of python and print area of a right angled triangle.

Code :

```
b=int(input())
h=int(input())
area=(h*b)/2
print(area)
```

Input :	**Output** :
3 5	7.5

Inference :

When given base and height of the triangle ,we use the formula (base*height)/2 and thus print the area of the right angled triangle.

Statement :

Write a program that greets the user by printing the word "Hello", a comma, the name of the user and an exclamation mark after it. See the examples below.

Objective :

To get familiar with basics of python and print with prefix “Hello” and suffix “!” with given name in the middle.

Code :

```
name=input()
print("Hello,",name+"!")
```

Input :	**Output** :
Harry	Hello, Harry!

Inference :

We use string concatenation with “+” sign and add the “!” sign at the end.

WEEK-2 (Integer and Float Numbers)

Statement:

Given an integer number, print its last digit.

Objective:

To get familiar with integer and float numbers

Code:

```
a=int(input())
print(a%10)
```

Input:	**Output** :
179	9

Inference:

If an integer is divided by 10 (i.e., modulus operator).The remainder gives last digit.

Statement:

Given an integer. Print its tens digit.

Objective:

To get familiar with integer and float numbers.

Code:

```
a=int(input())
a=a//10
a=a%10
print(a)
```

Input:	**Output:**
73	7

Inference:

We type-casted the result into string to concatenate the digits obtained.

Statement:

Given a three-digit number. Find the sum of its digits.

Objective:

To get familiar with integer and float numbers

Code:

```
a=int(input())
sum=0
sum=sum+(a%10)
a=a//10
sum=sum+(a%10)
a=a//10
sum=sum+(a%10)
print(sum)
```

Input:	**Output** :
179	17

Inference:

Here, when we use division with 100, 17 gives 1st digit and division followed by modulus division by 10 gives tens digit and modulus division by 10 gives remainder so if we add those it gives us sum of each individual of a 3-digit number.

Statement:

Given a positive real number, print its first digit to the right of the decimal point.

Objective:

To get familiar with integer and float numbers

Code:
```
a=float(input())
b=(int)(a*10)
print(b%10)
```

Input:	**Output** :
1.79	7

Inference:

When the decimal is multiplied and 1st use modulus by 10 then we get a decimal remainder which int is used and results to an integer.

WEEK – 3 (if, else - Loops)

Statement :

Given two integers, print the smaller value.

Objective : To get familiar to tell the smallest element in 2 user inputs if-else loops.

Code :

```
a=int(input())
b=int(input())
if a<b:
   print(a)
else:
   print(b)
```

Input :	**Output** :
3 7	3

Inference :

" : " allows the program to execute the if and else conditional statements if they are true.

Statement :

For the given integer X print 1 if it's positive, -1 if it's negative, or 0 if it's equal to zero. Try to use the cascade if-elif-else for it.

Objective :

To get familiar to tell whether a number is +ve or –ve using if-else loops.

Code :

```
a=int(input())
if a>0:
   print('1')
elif a<0:
   print('-1')
else:
   print('0')
```

Input :	**Output** :
-143	-1

Inference :

The way of style of if-else in python is similar to c but only format is different i.e., instead of else if we give elif.

Statement :

Given three integers, print the smallest value.

Objective :

To get familiar to tell the smallest element in 3 user inputs if-else conditional statements.

Code :

```
a=int(input())
b=int(input())
c=int(input())
if (a>b)&(c>b):
   print(b)
if (a>c)&(b>c):
   print(c)
if (c>a)&(b>a):
   print(a)
```

Input :	**Output** :
1 4 3	1

Inference :

Here ‘ & ’ is used whereas in c we use ‘ && ’ as an AND operation. Also we can use ‘ and ’ as a AND operator.

Statement :

Given three integers, determine how many of them are equal to each other. The program must print one of these numbers: 3 (if all are the same), 2 (if two of them are equal to each other and the third is different) or 0 (if all numbers are different).

Objective :

To get familiar with if-elif-else conditional statements.

Code :

```
a=int(input())
b=int(input())
c=int(input())
if (a==b)&(a==c):
   print(3)
elif (a!=b)&(a!=c)&(b!=c):
   print(0)
else:
   print(2)
```

Input :	**Output** :
1 4 1	2

Inference :

Here we use ‘ elif ’ instead of ‘ else if ’ and let to print the alternative conditional statement.

Statement :

Given two integers A and B. Print all numbers from A to B inclusively, in ascending order, if A < B, or in descending order, if A ≥ B.

Objective :

To get familiar with printing the numbers between 2 input numbers either in ascending or descending order for loops.

Code :

```
a=int(input())
b=int(input())
if a<b:
   for i in range(a,b+1,1):
      print(i)
else:
   for i in range(a,b-1,-1):
      print(i)
```

Input :	**Output** :
1 5	1 2 3 4 5

Inference :

It is similar to C only the format matters

for (i = a ; i<b+1 ; i++) / for I in range(a,b+1,1) → ascending

for (i = a ; i>b-1 ; i - -) / for I in range(a,b-1,-1) → descending

Statement :

5 numbers are given in the input. Read them and print their sum. Use as few variables as you can.

Objective :

To get familiar with finding the sum of 5 input numbers using for loops.

Code :

```
s=0
for i in range(10):
   a=int(input())
   s+=a
print(s)
```

Input :	**Output** :
1 2 3 4 5	15

Inference :

We can also write range (0,10,1) but by default it increments by 1 and also repeats for n times if we write range (n).

Statement :

N numbers are given in the input. Read them and print their sum.

The first line of input contains the integer N, which is the number of integers to follow. Each of the next N lines contains one integer. Print the sum of these N integers.

Objective :

To get familiar with finding the sum of n random numbers using for loops.

Code :

```
n=int(input())
s=0
for i in range(n):
   a=int(input())
   s=s+a
print(s)
```

Input :	**Output** :
4 3 3 3 3	12

Inference :

It is similar to before problem but here we give the no. of input values also.

Statement :

For the given integer N calculate the following sum:

$$1^3 + 2^3 + 3^3 + \ldots\ldots + N^3$$

Objective :

To get familiar with finding answers for different mathematical series using for loops.

Code :

```
n=int(input())
s=0
for i in range(1,n+1):
   s=s+(i**3)
print(s)
```

Input :	**Output** :
6	441

Inference :

Here to print the cubes we add and store its values in s and cube can also written as i**3 or i*i*i. and this is added to a variable s for every iteration of the for loop.

Statement :

In mathematics, the factorial of an integer n, denoted by $n!$ is the following product:

$$n!=1\times2\times\ldots\times n$$

For the given integer n calculate the value $n!$. Don't use `math` module in this exercise.

Objective :

To get familiar with finding the factorial using for loops.

Code :

```
n=int(input())
p=1
for i in range(1,n+1):
    p=p*i
print(p)
```

Input :	**Output** :
4	24

Inference :

In the range (1,n+1) we use 1 instead of 0 as p=p*I always becomes 0 as p=p*0=0 we get factorial of any number is ‘ 0 ’.

WEEK – 5 (Strings)

Statement :

You are given a string.

In the first line, print the third character of this string.

In the second line, print the second to last character of this string.

In the third line, print the first five characters of this string.

In the fourth line, print all but the last two characters of this string.

In the fifth line, print all the characters of this string with even indices (remember indexing starts at 0, so the characters are displayed starting with the first).

In the sixth line, print all the characters of this string with odd indices (i.e. starting with the second character in the string).

In the seventh line, print all the characters of the string in reverse order.

In the eighth line, print every second character of the string in reverse order, starting from the last one.

In the ninth line, print the length of the given string.

Objective :

To get familiar with strings and operations on strings.

Code :

```
s = input()
print(s[2])
print(s[-2])
print(s[:5])
```

```
print(s[:-2])
print(s[::2])
print(s[1::2])
print(s[::-1])
print(s[::-2])
print(len(s))
```

Input :	**Output** :
Abrakadabra	r r Abrak Abrakadab Arkdba baaar arbadakarbA abdkrA 11

Inference :

In the above program we need to print above statements using strings.

Statement :

Given a string consisting of words separated by spaces. Determine how many words it has. To solve the problem, use the method `count`.

Objective :

To count number of words in a given string.

Code :

```
print(input().count(' ') + 1)
```

Input :	**Output** :
Hello world	2

Inference :

using in bulit function “count” we count the number of words in a given statement.

Statement :

Given a string consisting of exactly two words separated by a space. Print a new string with the first and second word positions swapped (the second word is printed first).

This task should not use loops and if.

Objective :

To swap the words separated by space.

Code :

```
s = input()
n = s.find(' ')
print(s[n:], s[:n])
```

Input :	**Output** :
Hello, world!	world! Hello,

Inference :

Inbuilt function “find()” is used to find space, and indexing used from first and last.

Statement :

Given a string in which the letter h occurs at least twice. Remove from that string the first and the last occurrence of the letter h, as well as all the characters between them.

Objective :

To remove all characters in between the two letters of desired letter.

Code :

```
s = input()
print(s[:s.find('h')] + s[s.rfind('h')+1:])
```

Input :	**Output** :
In the hole in the ground there lived a hobbit	In tobbit

Inference :

Here find() and rfind() inbuilt functions are used to find desired letter and the first and last parts of strings are printed by using string slicings and concatenated by “+”.

Week – 6 (While Loops)

Statement :

For a given integer N, print all the squares of integer numbers where the square is less than or equal to N, in ascending order.

Objective :

To get familiar to print the squares up to a given range using while loops.

Code :

```
n=int(input())
i=1
while (i*i)<=n:
   print(i*i,end=' ')
   i+=1
```

Input :	**Output** :
50	1 4 9 16 25 36 49

Inference :

When i*I crosses the given n value, the while loop will be terminated. Also as i was incremented by 1 all the consecutive squares will be printed.

Statement :

A sequence consists of integer numbers and ends with the number 0. Determine how many elements of this sequence are greater than their neighbors above.

Objective :

To get familiar with finding no. of elements before the largest element in a sequence ending with 0.

Code :

```
i=int(input())
g=0
while(i!=0):
   j=int(input())
   if(i<j):
      g=g+1
   i=j
print(g)
```

Input :	**Output** :
1 4 3 0	1

Inference :

Here we need 2 elements to check the greatest among the neighbors, so we take j inside the while loop if i < j we increment g and assign j = i to check the next element.

Statement :

The Fibonacci sequence is defined as follows:

$$Ø_0=0, Ø_1=1, Ø_n= Ø_{n-1} + Ø_{n-2}.$$

Given a non-negative integer n, print the nth Fibonacci number $Ø_n$

This problem can also be solved with a `for` loop.

Objective :

To get familiar to find the nth Fibonacci number.

Code :

```
p=int(input())
n1,n2=0,1
i=0
while(i<p):
   n1,n2=n2,n1+n2
   i=i+1
print(n1)
```

Input :	**Output** :
4	3

Inference :

According to Fibonacci series n1 and n2 are assigned as 0 and 1. For every incrementation of i the successive Fibonacci numbers forms until i reaches the given position ‘ p ’.

Statement :

Given a sequence of integer numbers ending with the number 0. Determine the length of the widest fragment where all the elements are equal to each other.

Objective :

To get familiar to find the no. of greatest no. of successive elements in a sequence

Code :

```
i=int(input())
j=0
m,c=1,1
while i!=0:
   j=int(input())
   if i==j:
      c=c+1
   else:
      if c>m:
         m=c
      c=1
   i=j
print(m)
```

Input :	**Output** :
1 4 3 3 0	2

Inference :

The ‘ if ’ loop counts the similar elements and if any different element was given , ‘ else ’ loop will execute and assigns the count to m and again to start counting for other similar elements, c is again initialized to 1.

WEEK – 7 (LISTS)

Statement :

Given a list of numbers, find and print all the list elements with an even index number. (i.e. A[0], A[2], A[4], ...).

Objective :

To get familiar with Lists using an in built functions i.e., split(),join(),etc.

Code :

```
a = input().split()
for i in range(0, len(a), 2):
    print(a[i])
```

Input :	**Output** :
1 2 3 4 5	1 3 5

Inference :

The method split() has an optional parameter that determines which string will be used as the separator between list items

Statement:

Given a list of numbers, find and print all the elements that are greater than the previous element.

Objective:

To get familiar with the lists to store to store the multiple data types in a single variable.

Code:

```
a=[int(i) for i in input().split()]
for i in range(1,len(a)):
    if a[i]>a[i-1]:
        print(a[i])
```

Input:

1 5 2 4 3

Output:

5 4

Inference:

The method split() has an optional parameter that determines which string will be used as the separator between the list items.

Statement:

Given a list of numbers, find and print the first adjacent elements which have the same sign. If there is no such pair, leave the output blank.

Objective:

To get familiar with lists using an in built functions i.e,split(),join(),etc.

Code:

```
a=[int(i) for i in input().split()]
for i in range(1,len(a)):
    if a[i]*a[i-1]>0:
        print(a[i-1],a[i])
        break
```

Input:	**output:**
-1 2 3 -1 -2	2 3

Inference:

Here the entire list can be read using input().Using for loop and range of length of the string we can solve the given problem.

Statement :

Given a list of numbers ,determine the element in the list with the largest value.Print the value of the largest element and then the index number.If the highest element is not unique ,print the index of the first instance.

Objective :

To get familiar with the lists to store the multiple data types in a single variable.

Code :

```
a=[int(i) for i in input().split()]
index=0
for i in range(1,len(a)):
    if a[i]>a[index]:
        index=i
print(a[index],index)
```

Input :	**Output** :
1 2 3 2 1	3 2

Inference :

Here a.index(x) returns the index of the first occurrence of element x in the list . It is one of the operation of the list.

Statement :

Given a list of numbers with all of its elements sorted in ascending order, determine and print the quantity of distinct elements in it.

Objective :

To get familiar with lists using an in built function i.e., split( ) .

Code :

```
a = [int(i) for i in input().split()]
num_distinct = 1
for i in range(0, len(a) - 1):
    if a[i] != a[i + 1]:
        num_distinct += 1
print(num_distinct)
```

Input :	**Output** :
1 2 2 3 3 3	3

Inference :

In this program we used split() to take input and make it into a 1-D list . We also used an in-built function len() to find the length of an array .

Statement :

Given a list of numbers, find and print the elements that appear in the list only once. The elements must be printed in the order in which they occur in the original list

Objective :

To get familiar to print the elements that are in the list only ones.

Code :

```
a = [int(s) for s in input().split()]
uniqs = [ ]
for elem in a:
    if a.count(elem) == 1:
        uniqs.append(elem)
print(' '.join([str(i) for i in uniqs]))
```

Input :	Output :
1 2 2 3 3 3	1

Inference :

In these program i have learnt how to print the number that appears only one's in the list,the count function will count the number and it will append the number into another list.

Statement :

Write a function capitalize (low case words) that takes the lower case word and returns the word with the first letter capitalized. Eg., `print(capitalize('word'))` should print the word `Word`.Then, given a line of lowercase ASCII words (text separated by a single space), print it with the first letter of each word capitalized using the your own function `capitalize()`In Python there is a function `ord(character)`, which returns character code in the ASCII chart, and the function `chr(code)`, which returns the character itself from the ASCII code. For example, `ord('a') == 97`, `chr(97) == 'a'`.

Objective :

To understand the concept of recursion and capitalize 1st letter of every word in given input using a function in python.

Code :

```
a=str(input())
def cap(a):
   a=a.title(a)
   return a
print(cap(a))
```

Input :	**Output** :
harry potter	Harry Potter

Inference :

As ord() gives the ASCll value index and chr() gives the variable in that index so we split the sentence into words as elements in lists so we can access the starting letter and capitalize it.

Statement :

Given a positive real number aa and a non-negative integer nn. Calculate a^nan without using loops, ** operator or the built in function math.pow() Instead, use recursion and the relation $a^n = a \cdot a^{n-1}$an=a·an−1. Print the result form the function power(a , n).

Objective :

To understand the concept of recursion and finding the a power b using a function in python. Where a and b integers.

Code :

```
def power(a,b):
    if b == 0:
        return 1
    else:
        return a*power(a,b-1)
print(power(float(input()),int(input())))
```

Input :	**Output** :
2 3	8.0

Inference :

Here a and x should be in float as the power any number may be in float so if we give int then it may not give the accurate answer.

Statement :

Given a sequence of integers that end with a 00. Print the sequence in reverse order.

Don't use lists or other data structures. Use the *force* of recursion instead.

Objective :

To understand the concept of recursion and to print given inputs in reverse order using a function in python.

Code :

```
def reverse():
   a = int(input())
   if a != 0:
      reverse()
   print(a)
reverse()
```

Input :	**Output** :
1 2 3 0	0 3 2 1

Inference:

```
Rev()
  I = 1
      Rev()
        I = 2
            Rev()
                I = 0
                    Print(0)
          Print(2)
   Print(1)
```

So first 0 will be printed and then 1 and then 2.

Statement :

Given a non-negative integer n, print the nth Fibonacci number. Do this by writing a function `fib(n)` which takes the non-negative integer n and returns the Fibonacci number.

Don't use loops, use the *flair* of recursion instead. However, you should think about why the recursive method is much slower than using loops.

Objective :

To understand the concept of recursion and to print nth element of Fibonacci series using a function in python.

Code :

```
def fib(n):
   if n == 1 or n == 2:
      return  1
   else:
      return fib(n-1) + fib(n-2)
print(fib(int(input())))
```

Input :	**Output** :
6	8

Inference :

In Fibonacci series the nth term is equal to sum of (n-1)th +(n-2)th term.

First element of the series is 1, Fib(n-2)+fib(n-1) is recursion function

Statement :

Given two numbers nn and mm. Create a two-dimensional array of size (n×m)(n×m) and populate it with the characters "." and "*" in a checkerboard pattern. The top left corner should have the character "." .

Objective :

To print the format in chess board pattern based on the statement provided.

Code :

```
def chessboard(n, m):
    if (n + m) % 2 == 0:
        return '.'
    else:
        return '*'

n, m = [int(j) for j in input().split()]
a = [[chessboard(i, j) for j in range(m)] for i in range(n)]
for row in a:
    print(' '.join(row))
```

Input :	**Output** :
3 4	. * . * * . * . . * . *

Inference :

To fill the pattern along with nested loop a recursion function is used to locate the “.” at the corner leftmost part and in alternate pattern “*” is printed based on the array size.

Statement :

Given two positive integers mm and nn, mm lines of nn elements, giving an m×n m×n matrix AA,followed by two non-negative integers ii and jj less than nn, swap columns ii and jj of AA and print the result.Write a function swap_columns(a, i, j) and call it to exchange the columns.

Objective :

To swap the columns in a matrix using the data in the problem.

Code :

```
def swap_columns(a, i, j):
    for row in a:
        row[i], row[j] = row[j], row[i]
    return a
n, m = [int(k) for k in input().split()]
a = [[int(j) for j in input().split()] for i in range(n)]
i, j = [int(k) for k in input().split()]
for row in swap_columns(a, i, j):
    print(' '.join([str(i) for i in row]))
```

Input :	**Output** :
3 4 11 12 13 14 21 22 23 24 31 32 33 34 0 1	12 11 13 14 22 21 23 24 32 31 33 34

Inference :

In the above program the swapping of columns is done by recursive call which is called by the data in the nested for loop and later on index based the elements in the array are swapped.

Statement :

Given two positive integers mm and nn, mm lines of nn elements, giving an m×nm×n matrix AA,followed by one integer cc, multiply every entry of the matrix by c c and print the result.

Objective :

Multiplying each element of a matrix by a certain number through users input (Scale of a matrix).

Code:

```
x,y=[int(i) for i in input().split()]
a=[]
for i in range(x):
   a.append([int(j)for j in input().split()])
n=int(input())
for i in range(x):
   for j in range(y):
      print(a[i][j]*n,end=' ')
   print()
```

Input :	**Output** :
3 4 11 12 13 14 21 22 23 24 31 32 33 34 2	22 24 26 28 42 44 46 48 62 64 66 68

Inference :

Scale of a matrix is done by entering m,n through users input an c is the constant to be multiplied for each element in the matrix here append and split() methods are used.Along within the nested loop.

Statement :

Given three positive integers mm, nn and rr, mm lines of nn elements, giving an m×nm×n matrix A
A, and nn lines of rr elements, giving an n×rn×r matrix BB, form the product matrix ABAB, which is the m×rm×r matrix whose (i,k)(i,k) entry is the sum

$$A[i][1]*B[1][k]+\cdots+A[i][n]*B[n][k]$$

$$A[i][1]*B[1][k]+\cdots+A[i][n]*B[n][k]$$

and print the result.

Objective :

Multiply two matrices by entering row and column's values.

Code :

```
x,y,z=[int(i) for i in input().split()]
c=[0]*x
for i in range(x):
   c[i]=[0]*z
a=[[int(j) for j in input().split()]for i in range(x)]
b=[[int(l) for l in input().split()]for i in range(y)]
for n in range(x):
   for o in range(z):
      for p in range(y):
         c[n][o]+=a[n][p]*b[p][o]
for i in range(x):
   for j in range(z):
      print(c[i][j],end=' ')
   print()
```

Input :	**Output** :
3 4 2 0 1 2 3 4 5 6 7 8 9 10 11 2 3 0 4 5 -1 1 1	13 5 45 33 77 61

Inference :

Here multiplication of two matrices is done through the the user's input of row and column value of both the matrices within the nested for loop.and othe methods used here are split().

Week - 10 (Tuples)

Statement :

Take two inputs from the user one is to create a tuple and another one is an integer n. Write a program to print the tuple n times.

Create another tuple with the user given elements and concatenate both the tuples and print the result as shown in the example.

Objective :

To get familiar with concatenating two tuples.

Code :

```
e=int(input('Enter elemnent in tuple : '))
n=int(input('Enter no. times to be repeated : '))
t=(e,)
r=t*n
print(r)
e2=int(input('Enter element in another tuple : '))
t2=(e2,)
print('The concatenation of these two tuples are : ',r+t2)
```

Input :	Output :
Enter elemnent in tuple : 2 Enter no. times to be repeated : 5 (2, 2, 2, 2, 2) Enter element in another tuple : 5	The concatenation of these two tuples are : (2, 2, 2, 2, 2, 5)

Inference :

A tuple should have commas after every element so if we have a single element it will take it as a string / number / float. To rectify this we will keep comma after the element i.e., (e,)

Statement :

Write a program to add an element to a tuple based on the user-given value in a specific index, print the result as shown in the example. If the index is not in the range print the error message

Objective :

To get familiar with inserting an element into a tuple.

Code :

```
t=()
e=(int(i) for i in input('Enter elements to tuple : ').split())
for j in e:
    t=t+(j,)
print('Tuple :',t)
n=int(input('Enter element to be inserted : '))
p=int(input('Enter position to be inserted : '))
if p > len(t):
    print('--- ERROR ---\n')
else:
    r=t[:p-1]+(n,)+t[p-1:]
print('The new tuple is :',r)
```

Input :	Output :
Enter elements to tuple : 2 6 8 Tuple : (2, 6, 8) Enter element to be inserted : 4 Enter position to be inserted : 2	The new tuple is : (2, 4, 6, 8)

Inference :

The concept of slicing is similar to lists .to concatenate 2 tuples, simply we can use the ‘ + ’ operator. We assign the inserted element into a new tuple after slicing.

Statement :

Create a tuple with the user given elements. Write a program to remove an element from the input tuple, print the result as shown in the example. If the element is not present in the tuple print the error message.

Objective :

To get familiar with deleting an element in a tuple.

Code :

```
t=()
k=0
e=(int(i) for i in input('Enter elements to tuple : ').split())
for j in e:
    t=t+(j,)
print('Tuple :',t)
d=int(input('Enter element to be deleted : '))
for i in range(len(t)):
    if d is t[i]:
        t=t[:i]+t[i+1:]
        k=1
        break
if k==1:
    print('The new tuple is :',t)
else:
    print('--- ERROR ---\n')
```

Input :	Output :
Enter elements to tuple : 1 3 4 5 7 Tuple : (1, 3, 4, 5, 7) Enter element to be deleted : 4	The new tuple is : (1, 3, 5, 7)

Inference :

Similar to previous question but instead of adding we will not consider it and to know whether the element that need to be deleted is in the tuple we use a Boolean value i.e., k = 0.

Statement :

Create a tuple with the user given inputs. Take an index n from the user. Write a program to print the tuple element at index n, print the result as shown in the examples. If the given index range is not in the tuple print the error message

Objective :

To get familiar to display an element in a tuple.

Code :

```
t=()
e=(int(i) for i in input('Enter elements to tuple : ').split())
for j in e:
   t=t+(j,)
print('Tuple :',t)
i=int(input('Enter the index to display the element : '))
if i<len(t):
   print('The element in the tuple is :',t[i])
else:
   print('--- ERROR ---\n')
```

Input :	Output :
Enter elements to tuple : 1 2 3 4 5 Tuple : (1, 2, 3, 4, 5) Enter the index to display the element : 4	The element in the tuple is : 5

Inference :

Here if the index given is not less than the tuple size then it prints ERROR as the elements are indexed from 0 to (size - 1) so if we give more than this range it cannot take any inputs.

Statement :

Take two integers start index and end index as input from the console using input () function. Write a program to find the tuple elements within start index and end index, print the result as shown in the examples.

Objective :

To get familiar to display the elements between 2 inputs as index's in a tuple.

Code :

```
t=()
e=(int(i) for i in input('Enter elements to tuple : ').split())
for j in e:
    t=t+(j,)
print('Tuple :',t)
s=int(input('Enter the starting index : '))
e=int(input('Enter the ending index : '))
print('The elements in between the index\'s are : ',t[s+1:e])
```

Input :	Output :
Enter elements to tuple : 1 2 3 4 5 6 7 Tuple : (1, 2, 3, 4, 5, 6, 7) Enter the starting index : 1 Enter the ending index : 5	The elements in between the index's are : (3, 4, 5)

Inference :

Here we use the concept of tuple slicing and the arguments are given as the starting and ending index's

WEEK – 11 (Dictionaries)

Statement :

The text is given in a single line. For each word of the text count the number of its occurrences before it. A word is a sequence of non-whitespace characters. Two consecutive words are separated by one or more spaces. Punctiation marks are a part of a word, by this definition.

Objective :

To get familiar with usage of dictionaries and functions like get(),split() etc.,

Code :

```
counter = {}
for word in input().split():
    counter[word] = counter.get(word, 0) + 1
    print(counter[word] - 1, end=' ')
```

Input :	**Output** :
one two one two one	00112

Inference :

An empty dictionary can be created using the function dict() or an empty pair of curly braces {} (this is actually the reason the curly braces cannot be used to create an empty set).

Statement :

You are given a dictionary consisting of word pairs. Every word is a synonym the other word in its pair. All the words in the dictionary are different. After the dictionary there's one more word given. Find a synonym for him.

Objective :

To get familiar with applications of dictionaries .

Code :

```
n = int(input())
d = {}
for i in range(n):
first, second = input().split()
    d[first] = second
    d[second] = first
print(d[input()])
```

Input :	**Output** :
3 Hello Hi Bye Goodbye List Array Goodbye	Bye

Inference :

From this program I am able to find out the synonym of the word mentioned after the dictionary by using the dictionaries data structure in python.

Statement :

Given the text: the first line contains the number of lines, then given the lines of words. Print the word in the text that occurs most often. If there are many such words, print the one that is less in the alphabetical order

Objective :

To print the most occured word in the given words by iterating the dictionary.

Code :

```
counter = {}
for i in range(int(input())):
    line = input().split()
    for word in line:
        counter[word] = counter.get(word, 0) + 1
        max_count = max(counter.values())
        most_frequent = [k for k, v in counter.items() if v == max_count]
print(min(most_frequent))
```

Input :	**Output** :
1 apple orange banana banana orange	banana

Inference :

From this program I am able to iterate the dictionary and find the most occurred word among the given words. In this min(),max(),get() functions were used.

WEEK – 12(Files)

Statement:

Write a program to print each line of a file in reverse order

Objective:

To create a file and to print lines in the file in the reverse order.

Code :

```
print("Enter the Name of File: ")
fileName = input()
fileHandle = open(fileName, "w")
fileHandle = open(fileName, "r")
fileContent = ""
for content in fileHandle:
  fileContent = fileContent+content

print("\n----Content in Reverse Order----")
fileContent = fileContent[::-1]
print(fileContent)
```

Input :	**Output** :
Enter the Name of File: ravi.txt	----Content in Reverse Order----

Inference:

From this program, I am learn how to print the content of the file on the output tab in reverse order. I got to know now to open a file and using ::-1 can print from reverse order. i.e., last line first …. first line last.

Statement:

Write a program to print the number of lines, words and characters in a file

Objective:

To get Familiar with file operations and print the number of lines, words and char in a file

Code :

```
l,w,c=0,0,0
fN=input("Enter the Name of File : ")
file=open(fN,"r")

for line in file:
   wordlist = line.split()
   l+=1
   w+=len(wordlist)
   c+=len(line)

print("\nNumber of lines present in given file : ",l)
print("Number of words present in given file : ",w)
print("Number of characters present in given file : ",c-1)
```

Input :	**Output** :
Enter the Name of File : ravi.txt (Hello world! How are you)	Number of lines present in given file : 2 Number of words present in given file : 5 Number of characters present in given file : 23

Inference :

From this program, I am able to learn how to print the number of lines, words

And Characters in a file using for loop for counting n no of lines **For line in file** (is a recursive statement until the lines end) and closing the file and printing characters and words in a file.

Statement :

Write a Python program to copy one file to another file.

Objective :

To copy the content from one file to another file.

Code :

```
sFile = input("Enter the Name of Source File: ")
tFile = input("Enter the Name of Target File: ")

file1 = open(sFile, "r")
text = file1.readlines()

file2 = open(tFile, "w")
for s in text:
   file2.write(s)

print("\nFile Copied Successfully!")
```

Input :	**Output** :
Enter the Name of Source File: ravi.txt Enter the Name of Target File: kiran.txt	File Copied Successfully!

Inference :

From this program, I am able to learn how to copy the content of a existing file to a new file. I got to know different modes of opening a file. I got to know how to use for loop.

WEEK-13

QUESTION 1 :

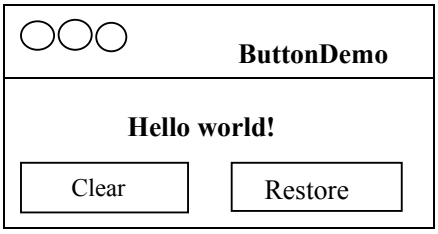
Write a Python GUI program using breezypythongui library, to demonstrate command button events. To clear and restore a message using two command buttons called clear and restore.

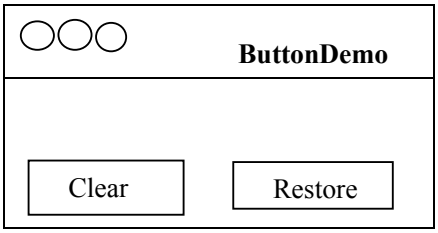
OBJECTIVE: GUI

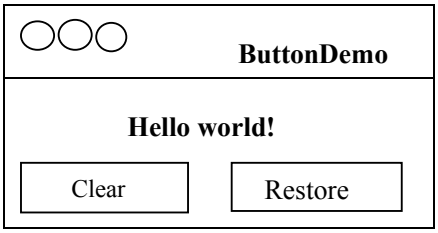
PROGRAM:

```
from breezypythongui import EasyFrame
class ButtonDemo(EasyFrame):
    def __init__(self):
        EasyFrame.__init__(self)
        self.label=self.addLabel(text="Hello world!",row=0,column=0,columnspan=2,sticky="NSEW")
        self.clearBtn=self.addButton(text="Clear",row=1,column=0,command=self.clear)
        self.restoreBtn=self.addButton(text="Restore",row=1,column=1,state="disabled",command=self.restore)
    def clear(self):
        self.label["text"]=""
        self.clearBtn["state"]="disabled"
        self.restoreBtn["state"]="normal"
    def restore(self):
        self.label["text"]="Hello world!"
        self.clearBtn["state"]="normal"
        self.restoreBtn["state"]="disabled"
def main():
    ButtonDemo().mainloop()
if __name__ == "__main__":
    main()
```

OUTPUT:







INFERENCE:

QUESTION 2 :

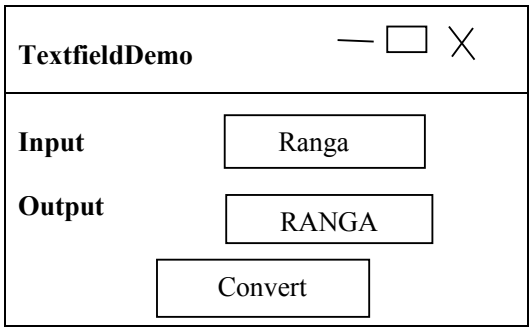
Write a Python GUI program using breezypythongui library, to demonstrate text fields.
Convert the given text to upper case

OBJECTIVE: GUI

PROGRAM:

```
from breezypythongui import EasyFrame
class TextFieldDemo(EasyFrame):
    def __init__(self):
        EasyFrame.__init__(self,title="Text Field Demo")
        self.addLabel(text="Input",row=0,column=0)
        self.inputField=self.addTextField(text="",row=0,column=1)
        self.addLabel(text="Output",row=1,column=0)
        self.outputField=self.addTextField(text="",row=1,column=1,state="readonly")
        self.addButton(text="Convert",row=2,column=0,columnspan=2,command=self.convert)
    def convert(self):
        text=self.inputField.getText()
        result=text.upper()
        self.outputField.setText(result)
def main():
    TextFieldDemo().mainloop()
if __name__ == "__main__":
    main()
```

OUTPUT 1:



INFERENCE:

QUESTION 3 :

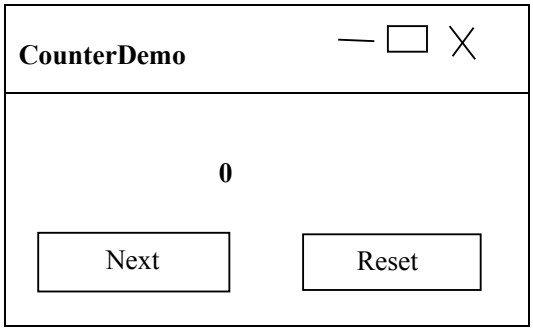
Write a Python GUI program using breezypythongui library, to demonstrate integer and float fields. Calculate the square root of the given number. Handle exceptions and display an error message if the user gives a negative number as input.

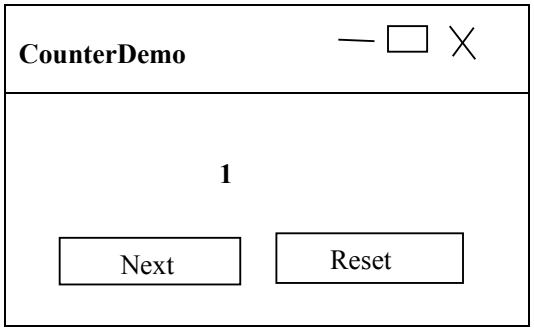
OBJECTIVE: GUI

PROGRAM:

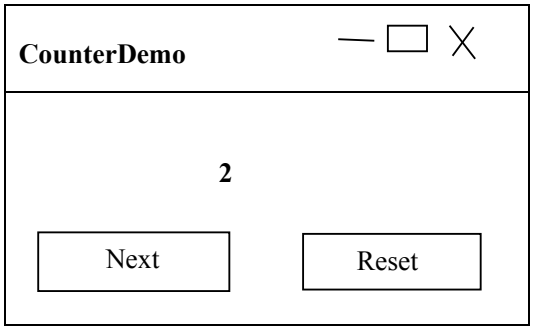
```
from breezypythongui import EasyFrame
import math
class NumberFieldDemo(EasyFrame):
    def __init__(self):
        EasyFrame.__init__(self,title="Number Field Demo")
        self.addLabel(text="An integer",row=0,column=0)
        self.inputField=self.addIntegerField(value=0,row=0,column=1,width=10)
        self.addLabel(text="Square root",row=1,column=0)
        self.outputField=self.addFloatField(value=0.0,row=1,column=1,width=8,precision=2,state="readonly")
        self.addButton(text="Compute",row=2,column=0,columnspan=2,command=self.computeSqrt)
    def computeSqrt(self):
        try:
          number=self.inputField.getNumber()
          result=math.sqrt(number)
          self.outputField.setNumber(result)
        except ValueError :
            self.messageBox(title="ERROR",message="Input must be an integer>=0")
def main():
    NumberFieldDemo().mainloop()
if __name__=="__main__":
    main()
```

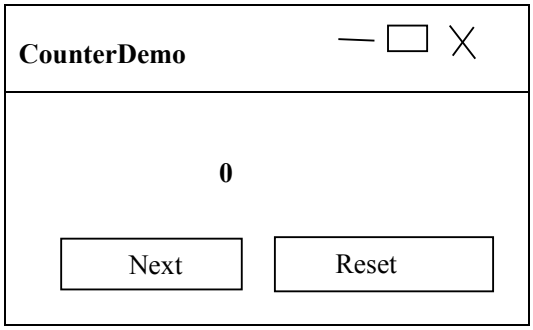
OUTPUT 1 :





Reset:





INFERENCE:

QUESTION 4 :

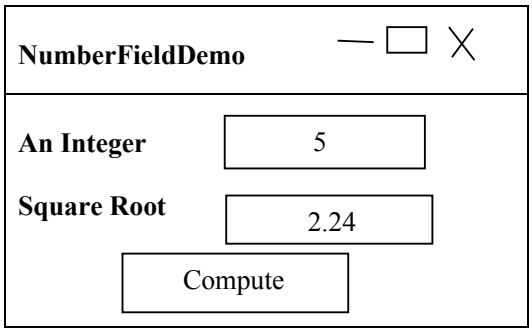
Write a Python GUI program using breezypythongui library, to demonstrate instance variable. Implement a counter increment program on a button event, and reset the counter to 0 when the user presses the reset button.

OBJECTIVE: GUI

PROGRAM:

```
from breezypythongui import EasyFrame
class CounterDemo(EasyFrame):
    def __init__(self):
        EasyFrame.__init__(self,title="CounterDemo")
        self.setSize(200,75)
        self.count=0
        self.label=self.addLabel(text="0",row=0,column=0,sticky="NSEW",columnspan=2)
        self.addButton(text="Next",row=1,column=0,command=self.next)
        self.addButton(text="Reset",row=1,column=1,command=self.reset)
    def next(self):
        self.count+=1
        self.label["text"]=str(self.count)
    def reset(self):
        self.count=0
        self.label["text"]=str(self.count)
def main():
    CounterDemo().mainloop()
if __name__=="__main__":
    main()
```

OUTPUT :



INFERENCE :

PBL Programs

Week – 1 (input, print, numbers)

Statement : Write a program that reads an integer number and prints its previous and next numbers. See the examples below for the exact format your answers should take. There shouldn't be a space before the period.

Objective : To get familiar with basic python operations and functions.

Code :

```
N=int(input())
P=N//100%10
A=N%10
Print(P,A)
```

Input :	**Output** :
143	1 3

Inference :

The given number is divided into 2 parts, one is units place and another one is hundreds place. Finally, we concatenate the two variables.

Statement : A school decided to replace the desks in three classrooms. Each desk sits two students. Given the number of students in each class, print the smallest possible number of desks that can be purchased.

The program should read three integers: the number of students in each of the three classes, a, b and c respectively.

Objective : To get familiar with basic python operations and functions.

Code :

```
a=int(input())
b=int(input())
c=int(input())
r=((a // 2)+(b // 2)+(c // 2))
c=((a % 2)+(b % 2)+(c % 2))
print(r+c)
```

Input :	**Output** :
25 21 16	36

Inference :

We use floating point division to get the exact number of desks which are occupied by 2 students. If any student was not occupied we arrange another desk for him hence we use % to get the unfilled students.

Week – 2 (Integers, Floats)

Statement : Given a four-digit integer number, perform its cyclic rotation by two digits, as shown in the tests below.

Objective : To get familiar with basic python operations and functions.

Code :

```
a=int(input())
o=a%10
u=(a//10)%10
h=(a//100)%10
t=(a//1000)%10
print(u,o,t,h)
```

Input :	**Output** :
1432	3214

Inference :

Here we divide each and every digit of the given number and rearranged them by 2 digits in the print statement.

Statement : Let's count the days of the week as follows: 0 - Sunday, 1 - Monday, 2 - Tuesday, ..., 6 - Saturday. Given an integer K in the range 1 to 365, find the number of the day of the week for the K-th day of the year provided that this year's January 1 is Thursday.

Objective :To get familiar with basic python operations and functions.

Code :

```
k=int(input('Enter the Kth day of the year : '))
print('The day\'s number is : '+str((k+3)%7))
```

Input :	**Output** :
Enter the Kth day of the year : 45	The day’s number is : 6

Inference :

Here 0,1,2…6 are obtained as remainders while dividing with 7 and assign 0 to Sunday and so on. But when k=1 it is actually Thursday as given so we add 3 to K and then divide it by 7.

Statement : Given the integer N - the number of minutes that is passed since midnight - how many hours and minutes are displayed on the 24h digital clock?

The program should print two numbers: the number of hours (between 0 and 23) and the number of minutes (between 0 and 59).

For example, if N = 150, then 150 minutes have passed since midnight - i.e. now is 2:30 am. So the program should print 2 30.

Objective : To get familiar with basic python operations and functions.

Code :

```
t=int(input('Enter the No. of minutes : '))
print(str(t//60)+':'+str(t%60))
```

Input :	**Output** :
275	4 35

Inference :

M gives the exact division of the given minutes into 60 parts which gives the number of hours. And the remainder gives the number of minutes.

Statement : A cupcake costs A dollars and B cents. Determine, how many dollars and cents should one pay for N cupcakes. A program gets three numbers: A, B, N. It should print two numbers: total cost in dollars and cents.

Objective: to get familiar with the operations and the functions in python.

Code :

```
d=int(input('Enter the No. of Dollars : '))
c=int(input('Enter the No. of cents : '))
n=int(input('Enter the No. of cup cakes : '))
td=n*(100*d+c)//100
tc=n*(100*d+c)%100
print('The Total No. of dollars are '+str(td)+' and cents are '+str(tc)+'.')
```

Input :	**Output** :
Enter the No. of Dollars : 20 Enter the No. of cents : 15 Enter the No. of cup cakes : 7	The Total No. of dollars are 141 and cents are 5.

Inference :

Here we convert the total amount into cents and divide into 100 parts to give the number of dollars and remainder gives number of cents.

Statement : A snail goes up A feet during the day and falls B feet at night. How long does it take him to go up H feet? Given three integer numbers H, A and B (A > B), the program should output a number of days.

Objective : to get familiar with the operations and the functions in python.

Code :

```
import math
a=int(input('Enter the height at day time : '))
b=int(input('Enter the height at night time : '))
h=int(input('Enter the height of the well : '))
d=abs((h-a)/(a-b))
t=math.ceil(d)
print('The No. of days to cover the given height = '+str(t))
```

Input :	**Output** :
Enter the height at day time : 9 Enter the height at night time : 5 Enter the height of the well : 50	The No. of days to cover the given height = 11

Inference :

For (h-a) height the snail travels n days and in one day the snail travels (a-b) meters so, to get the number of days that travels to cover height H is (h-a)/(a-b) meters.

Week – 3 (Conditions: if, then, else)

Statement :The program should print YES if a white pawn can possibly move from the first square to the second square in one move in some game - either by move or by capture. The program should print NO otherwise. The first four tests correspond to the green arrows on the picture.

Objective : to get familiar with the operations and the functions in python.

Code :

```
a1=int(input())
b1=int(input())
a2=int(input())
b2=int(input())
if (a1==a2)&(b2-b1<3):
   print('YES')
elif (a1==a2)&(b2-b1==1)|(a2-a1==-1)&(b2-b1==1)|(a2-a1==1)&(b2-b1==1):
   print('YES')
else:
   print('NO')
```

Input :	**Output** :
2 3 2 5	YES

Inference :

when the Pawn was in its initial position i.e., 2nd row, it can move 2 (or) 1 block at a time, so when x-coordinate is 2 and y-coordinate's difference is less than or equal to 2 (or) 1 or else, it can move only one step when x coordinate is not equal to 2 also if any Black pawn was diagonal, it can capture it. So, difference in its y-coordinates should be 1 and x coordinate can be -1 or 1.

Statement : Given the month (an integer from 1 to 12) and the day in it (an integer from 1 to 31) in the year 2017 (or in any other common year), print the month and the day of the next day to it. The first test corresponds to March 30 and March 31. The second test corresponds to March 31 and April 1.

Objective : to get familiar with the operations and the functions in python.

Code :

```
y=int(input('Enter a year : '))

if (y%4==0)&(y%100!=0)|(y%400==0):
   lp=1
   print('   It is a leap year.')
else:
   lp=0
   print('   It is not a leap year.')

m=int(input('Enter a month [1-12] : '))

if m in (1, 3, 5, 7, 8, 10, 12):
   ml=31
elif m==2:
   if lp==1:
      ml=29
   else:
      ml=28
else:
   ml=30

if ml==31:
   d=int(input('Enter a day [1-31] : '))
elif ml==28:
   d=int(input('Enter a day [1-28] : '))
```

```
else:
   d=int(input('Enter a day [1-29] : '))

print('   The present date is %d/%d/%d.' % (d, m, y))
if d<ml:
   d+=1
else:
   d=1
   if m==12:
      m=1
      y+=1
   else:
      m+=1

print('   The next date is %d/%d/%d.' % (d, m, y))
```

Input :	**Output** :
Enter a year : 2017 It is not a leap year. Enter a month [1-12] : 2 Enter a day [1-28] : 28	The present date is 28/2/2017. The next date is 1/3/2017.

Inference :

initially we give input for the year and if it is a leap year, in February it should have 29 days after giving month, we give the range for each month. finally giving day if the day equal to month length we should increment month and assign day 1 to day. also, if the given day and month is the end of the year, we assign 1 to day and month, and increment only year.

Week – 4 (Loops (For and While))

Statement : There was a set of cards with numbers from 1 to N. One of the card is now lost. Determine the number on that lost card given the numbers for the remaining cards. Given a number N, followed by N − 1 integers - representing the numbers on the remaining cards (distinct integers in the range from 1 to N). Find and print the number on the lost card.

Objective : to get familiar with the operations and the functions in python.

Code :

```
n=int(input())
s=0
for i in range(n-1):
   i=int(input())
   s+=i
t=n*(n+1)//2
print(t-s)
```

Input :	**Output** :
4 1 2 4	3

Inference :

We will add all arguments and subtract it from summation of n terms of consecutive numbers up to n.so that we get the lost card.

Statement : For given integer n ≤ 9 print a ladder of n steps. The k-th step consists of the integers from 1 to k without spaces between them. To do that, you can use the sep and end arguments for the function print().

Objective : to get familiar with the operations and the functions in python.

Code :

```
n=int(input())
for i in range(1,n+1):
    k=1
    for j in range(1,i+1):
        print(k,end='')
        k=k+1
    print()
```

Input :	**Output** :
3	1 12 123

Inference :

We use ‘end’ to continue from the position where the for loop was terminated. Also print function without any arguments will work like a ‘/n’ function.

Statement :

For a given integer N, find the greatest integer x where 2x is less than or equal to N. Print the exponent value and the result of the expression 2x.

Don't use the operation **.

Objective :

To get familiar to find least power of 2 that is less than or equal to given number.

Code :

```
n=int(input())
x=0
e=1
while(n>=e):
   x=x+1
   e=e*2
print(x-1,e//2)
```

Input :	**Output** :
50	5 32

Inference :

Here e = 2^x ,where x = 0, e = 1 and for every incrementation of x, e is multiplied by 2. We want the x and e values before executing the true condition of the loop so we print x -1 and e // 2.

Statement :

As a future athlete you just started your practice for an upcoming event. Given that on the first day you run x miles, and by the event you must be able to run y miles.

Calculate the number of days required for you to finally reach the required distance for the event, if you increases your distance each day by 10% from the previous day.

Print one integer representing the number of days to reach the required distance.

Objective :

To get familiar with calculating the time taken to cover the given distance.

Code :

```
x=int(input())
y=int(input())
d=1
while(x<y):
   x=x*1.1
   d=d+1
print(d)
```

Input :	**Output** :
10 20	9

Inference :

In 1 day it takes x miles, next day it becomes (x + x*10%) = x*(1+0.1) = x*1.1 and for every execution of while loop we increment number of days.

Statement :

Given a sequence of non-negative integers, where each number is written in a separate line. Determine the length of the sequence, where the sequence ends when the integer is equal to 0. Print the length of the sequence (not counting the integer 0). The numbers following the number 0 should be omitted.

Objective :

To get familiar to calculate the length of an given sequence ending with 0.

Code :

```
c=0
while(int(input())!=0):
  c=c+1
print(c)
```

Input :	**Output** :
1 4 3 0	3

Inference :

For every execution of while we give an input, if it is not equal to 0 we increment the count which gives the number of elements. Finally we print the count.

Statement :

A sequence consists of integer numbers and ends with the number 0. Determine the index of the largest element of the sequence. If the highest element is not unique, print the index of the first of them.

Objective :

To get familiar with finding the index of maximum element in a sequence.

Code :

```
i=int(input())
m=0
l=1
while(i!=0):
    if(i>m):
        m=i
        c=l
    i=int(input())
    l=l+1
print(c)
```

Input :	**Output** :
1 4 3 0	2

Inference :

Here l should be incremented for every execution of while loop at the same time we check the maximum element and initiate the l value ‘ at that point ’ to c.

Statement :

The Fibonacci sequence is defined as follows:

$\emptyset_0=0, \emptyset_1=1, \emptyset_n= \emptyset_{n-1} + \emptyset_{n-2}.$

Given an integer a, determine its index among the Fibonacci numbers, that is, print the number n such that $\emptyset_n$=a. If a is not a Fibonacci number, print -1.

Objective :

To get familiar to know whether the given number is present in the Fibonacci series or not.

Code :

```
n=int(input())
n1,n2=0,1
i=0
while(n1<n):
   n1,n2=n2,n1+n2
   i+=1
if n==n1:
   print(i)
else:
   print('-1')
```

Input :	**Output** :
13	7

Inference :

The while loop gives Fibonacci series up to n, and if n == n1 that means n exits in the Fibonacci series and else loop is executed if n2 > n.

WEEK – 8 (Functions and recursion)

Statement:

Given four real numbers representing cartesian coordinates: (x1,y1),(x2,y2)(x1,y1),(x2,y2). Write a function distance (x1, y1, x2, y2) to compute the distance between the points (x1,y1)(x1,y1) and (x2,y2)(x2,y2). Read four real numbers and print the resulting distance calculated by the function.

The formula for distance between two points can be found at wolfram.

Objective:

To understand the concept of functions and finding the distance between 2 points using a function in python.

code :

```
a=float(input())
b=float(input())
c=float(input())
d=float(input())
def segment(a,b,c,d):
   d=((a-c) **2 + (b-d) **2)**(1/2)
   print(d)
segment(a,b,c,d)
```

Input :	**Output** :
0 0 1 1	1.4142135623730951

Inference :

Distance between 2 points (x1,y1) & (x2,y2) is sqrt(sqrt(x1-x2)+sqrt(y1-y2)) => ((x1-x2)**2 + (y1-y2)**) as also input should be given in float as in co-ordinate axes have all type of values.

Statement :

Given a positive real number aa and **integer** nn.
Compute anan. Write a function `power (a,n)` to calculate the results using the function and print the result of the expression. Dont use the same function from the standard library.

Objective :

To understand the concept of recursion and finding the , a power b using a function in python. where a and b integers.

Code :

```
def power(a,n):
    res=1
    for i in range (abs(n)):
        res*=a
    if n>=0:
        return res
    else:
        return 1/res
print(power(float(input()),int(input())))
```

Input :	**Output** :
2 -3	0.125

Inference :

Here a and x should be in float as the power any number may be in float so if we give int then it may not give the accurate answer.

Statement :

Given a string. Cut it into two "equal" parts (If the length of the string is odd, place the center character in the first string, so that the first string contains one more character than the second). Now print a new string on a single row with the first and second half's interchanged (second half first and the first half second)
Don't use the statement `if` in this task.

Objective :

To make the string into two halves and print.

Code :

```
s = input()
l = int(len(s)/2)
print(s[-l:]+s[:-l])
```

Input :	**Output** :
Hi	iH

Inference :

Here we used in built "len()" function to find the length of string and indexing for printing.

Statement :

Given a string that may or may not contain a letter of interest. Print the index location of the first and last appearance of f. If the letter f occurs only once, then output its index. If the letter f does not occur, then do not print anything.

Don't use loops in this task.

Objective :

to print first and last occurrences.

Code :

```
s = input()
c = s.count('f')
if c == 1:
   print(s.find('f'))
if c > 1:
   print(s.find('f'),s.rfind('f'))
```

Input :	**Output** :
comfort	3

Inference :

Inbuilt function find() and rfind() are used,and count() is used.

Statement :

Given a string that may or may not contain the letter of interest. Print the index location of the second occurrence of the letter f. If the string contains the letter f only once, then print -1, and if the string does not contain the letter f, then print -2.

Objective :

to find the index of second occurrence of desired letter.

Code :

```
s = input()
c = s.count('f')
if c == 0:
   print(-2)
if c == 1:
   print(-1)
if c > 1:
   print(s.find('f', s.find('f') + 1))
```

Input :	**Output** :
comfort	-1

Inference :

Here inbuilt function find () is used and count() is used

Statement :

Given a list of numbers, find and print all elements that are an even number. In this case use a for-loop that iterates over the list, and not over its indices! That is, don't use range()

Objective :

To get familiar with Lists using an in built functions i.e., split(),join(),etc.

Code :

```
a = [int(i) for i in input().split()]
for elem in a:
    if elem % 2 == 0:
        print(elem)
```

Input :	**Output** :
1 2 2 3 3 3 4	2 2 4

Inference :

Here the entire list can be read using input().We can use a string method split(),which returns a list of string separated by spaces.

Statement :

Given a list of numbers, determine and print the quantity of elements that are greater than both of their neighbors.

Objective :

To get familiar with the Lists to store the multiple data types in a single variable.

Code :

```
a=[int(i) for i in input().split()]
count=0
for i in range(1,len(a)-1):
    if(a[i-1]a[i+1]):
        count+=1
print(count)
```

Input :	**Output** :
1 2 3 4 5	0

Inference :

The method split() has an optional parameter that determines which string will be used as the separator between the list items .

Statement :

Given a list of numbers, swap adjacent items in pairs (A[0] with A[1], A[2] with A[3], etc.). Print the resulting list. If a list has an odd number of elements, leave the last element in place.

Objective :

To get familiar with lists using some in built function i.e., split( ) , join( ).

Code :

```
a = [int(i) for i in input().split()]
for i in range(1, len(a), 2):
    a[i - 1], a[i] = a[i], a[i - 1]
print(' '.join([str(i) for i in a]))
```

Input :	**Output** :
1 2 3 4 5	2 1 4 3 5

Inference :

In this program we used the range( ) with range of 2 , so that we can exchange alternative positions in lists . We also used the join( ) to print the output in a single line .

Statement :

In chess it is known that it is possible to place 8 queens on an 8×8 chess board such that none of them can attack another. Given a placement of 8 queens on the board, determine if there is a pair of queens that can attach each other on the next move. Print the word `NO` if no queen can attack another, otherwise print `YES`. The input consists of eight coordinate pairs, one pair per line, with each pair giving the position of a queen on a standard chess board with rows and columns numbered starting at 1.

Objective :

To get familiar to print the exact place of the 8 queens no queen would be attacked by other.

Code :

```
N = 8
result = 'NO'
x = [0] * N
y = [0] * N
for i in range(N):
    x[i], y[i] = [int(j) for j in input().split()]
for i in range (N):
    for j in range(i+1,N):
        if x[i] == x[j] or y[i] == y[j] or abs(x[i] - x[j]) == abs(y[i] - y[j]):
            result = 'YES'
print(result)
```

Input :	**Output** :
1 7 2 4 3 2 4 8 5 6	No

Inference :

In these progrom i have learnt how to print the 8 queens in the chess board without attacking the one queen to the another ,in these we have used range function.

Statement :

In bowling, the player starts wtih 10 pins at the far end of a lane. The object is to knock all the pins down. For this exercise, the number of pins and balls will vary. Given the number of pins *N* and then the number of balls *K* to be rolled, followed by *K* pairs of numbers (one for each ball rolled), determine which pins remain standing after all the balls have been rolled. The balls are numbered from 1 to *N* (inclusive) for this situation. The subsequent number pairs, one for each *K* represent the start to stop (inclusive) positions of the pins that were knocked down with each role. Print a sequence of *N* characters, where `"I"` represents a pin left standing and `"."` represents a pin knocked down.

Objective :

To get familiar to print "!" represents a pin left standing and "." represents a pin knocked down.

Code :

```
N, K = [int(i) for i in input().split()]
kegels = ['I'] * N
for j in range(K):
    l, r = [int(i) for i in input().split()]
    kegels[l-1:r] = ['.'] * (r-l+1)
print(''.join([str(i) for i in kegels]))
```

Input :	Output :
10 3 8 10 2 5 3 6	I.....I...

Inference :

In these program i have learnt how to print how many balls rolled and how many pins has been dropped,we have used split function and join function.

WEEK – 9 (Two Dimensional lists (Arrrays))

Statement :

Given two integers representing the rows and columns (m×n)(m×n), and subsequent m rows of nn elements, find the index position of the maximum element and print two numbers representing the index (i×j)(i×j) or the row number and the column number. If there exist multiple such elements in different rows, print the one with smaller row number. If there multiple such elements occur on the same row, output the smallest column number.

Objective :

To find the index of maximum element in a matrix(multi-dimensional list).

Code :

```
n,m=[int(j) for j in input().split()]
a=[[int(j) for j in input().split()] for i in range(n)]
max_row = 0
max_col = 0
max=a[max_row][max_col]
for i in range(n):
   for j in range(m):
      if max < a[i][j]:
         max = a[i][j]
         max_row=i
         max_col=j
print(max_row,max_col)
```

Input :	**Output** :
3 4 0 3 2 4 2 3 5 5 5 1 2 3	1 2

Inference :

Here in the above program we are using nested loop (one is for row and other for column).Within that code is written to find the index of maximum element in the matrix by iteration through the nested loop.

Statement :

Given an odd number integer n, produce a two-dimensional array of size (n×n) (n×n). Fill each element with a single character string of "." . Then fill the middle row, the middle column and the diagnols with the single character string of "*" (an image of a snow flake). Print the array elements in (n×n)(n×n) rows and columns and separate the characters with a single space.

Objective :

To fill the matrix (odd number n through users input (n*n) matrix) in the above requirement pattern (mentioned in statement).

Code :

```
n = int(input())
k= n//2
a=[['.'] * n for i in range(n)]
for i in range(n):
    a[k][i]='*'
    a[i][k]='*'
    a[i][i]='*'
    a[n-i-1][i]='*'
for row in a:
    print(' '.join(row))
```

Input :	**Output** :
5	* . * . * . * * * . * * * * * . * * * . * . * . *

Inference :

Printing the pattern by taking users input (odd n value).And filling the characters based on the indexing method a code is written within a nested loop. In middle and diagonals “*”, otherwise ”.” is printed.

Statement :

Given an integer n, produce a two-dimensional array of size (n×n)(n×n) and complete it according to the following rules, and print with a single space between characters: On the main diagonal write 0 . On the diagonals adjacent to the main, write 1 . On the next adjacent diagonals write 2 and so forth. Print the elements of the resulting array.

Objective :

To print the matrix by placing all zeros at diagonal fashion later on increasing by 1 based on the size of the matrix.

Code :

```
n = int(input())
a=[[abs(i-j) for j in range(n)] for i in range (n)]
for row in a:
    print(' '.join([str(i) for i in row]))
```

Input :	**Output** :
5	0 1 2 3 4 1 0 1 2 3 2 1 0 1 2 3 2 1 0 1 4 3 2 1 0

Inference :

Here printing the matrix on placing 0's at main diagonal and adjacent to that it is increased further by using abs() function.And the code is written within the nested loop.And n value is given through user's input.

Statement :

Given an integer n, create a two-dimensional array of size (n×n)
(n×n) and populate it as follows, with spaces between each character: The positions on the minor diagonal (from the upper right to the lower left corner) receive 1 . The positions above this diagonal receive 0 . The positions below the diagonal receive 2 . Print the elements of the resulting array.

Objective :

To print the array based on the problem(arrangement in side diagonal fashion). 1's at the positon (from the upper right to lower left corner) and position below diagonal receive 2.

Code :

```
n = int(input())
a = [0] * n
a = [[0] * (n - i - 1) + [1] + [2] * i for i in range(n)]
for row in a:
    print(' '.join([str(i) for i in row])
```

Input :	**Output** :
4	0 0 0 1 0 0 1 2 0 1 2 2 1 2 2 2

Inference :

Here printing the above matrix is done by iteration through for loop and aloso by join() method.

Week - 10 (Tuples)

Statement :

Take two inputs from the user one is to create a tuple and another one is an integer n. Write a program to print the tuple n times.

Create another tuple with the user given elements and concatenate both the tuples and print the result as shown in the example.

Objective :

To get familiar with concatenating two tuples.

Code :

```
e=int(input('Enter elemnent in tuple : '))
n=int(input('Enter no. times to be repeated : '))
t=(e,)
r=t*n
print(r)
e2=int(input('Enter element in another tuple : '))
t2=(e2,)
print('The concatenation of these two tuples are : ',r+t2)
```

Input :	Output :
Enter elemnent in tuple : 2 Enter no. times to be repeated : 5 (2, 2, 2, 2, 2) Enter element in another tuple : 5	The concatenation of these two tuples are : (2, 2, 2, 2, 2, 5)

Inference :

A tuple should have commas after every element so if we have a single element it will take it as a string / number / float. To rectify this we will keep comma after the element i.e., (e,)

Statement :

Take two integers start index and end index as input from the console using input () function. Write a program to find the tuple elements within start index and end index, print the result as shown in the examples.

Objective :

To get familiar to display the elements between 2 inputs as index's in a tuple.

Code :

```
t=()
e=(int(i) for i in input('Enter elements to tuple : ').split())
for j in e:
    t=t+(j,)
print('Tuple :',t)
s=int(input('Enter the starting index : '))
e=int(input('Enter the ending index : '))
print('The elements in between the index\'s are : ',t[s+1:e])
```

Input :	Output :
Enter elements to tuple : 1 2 3 4 5 6 7 Tuple : (1, 2, 3, 4, 5, 6, 7) Enter the starting index : 1 Enter the ending index : 5	The elements in between the index's are : (3, 4, 5)

Inference :

Here we use the concept of tuple slicing and the arguments are given as the starting and ending index's

Statement :

As you know, the president of USA is elected not by direct vote, but through a two-step voting. First elections are held in each state and determine the winner of elections in that state. Thereafter, the state election is going: in this election, every state has a certain the number of votes — the number of electors from that state. In practice, all the electors from the state of voted in accordance with the results of the vote within a state the first line contains the number of records. After that, each entry contains the name of the candidate and the number of votes they got in one of the states. Count the total results of the elections: sum the number of votes for each candidate. Print candidates in the alphabetical order.

Objective : To print the candidates and their votes in alphabetical order

Code :

```
num_votes = {}
for _ in range(int(input())):
    candidate, votes = input().split()
    num_votes[candidate] = num_votes.get(candidate, 0) + int(votes)
for candidate, votes in sorted(num_votes.items()):
    print(candidate, votes)
```

Input :	**Output** :
5 McCain 10 McCain 5 Obama 9 Obama 8 McCain 1	 McCain 16 Obama 17

Inference :

From this program I am able to arrange the elements in a dictionary in alphabetical order and can add same elements and print their result.

Statement :

The virus attacked the filesystem of the supercomputer and broke the control of access rights to the files. For each file there is a known set of operations which may be applied to it:

write W,

read R,

execute X.

The first line contains the number N — the number of files contained in the filesystem. The following N lines contain the file names and allowed operations with them, separated by spaces. The next line contains an integer M — the number of operations to the files. In the last M lines specify the operations that are requested for files. One file can be requested many times.

You need to recover the control over the access rights to the files. For each request your program should return OK if the requested operation is valid or Access denied if the operation is invalid.

Objective : To iterate the dictionary by giving the key word and finding whether the access is given or denied.

Code :

```
ACTION_PERMISSION = {
   'read': 'R',
   'write': 'W',
   'execute': 'X',
}
file_permissions = {}
```

Statement :

Given a number n, followed by n lines of text, print all words encountered in the text, one per line. The words should be sorted in descending order according to their number of occurrences in the text, and all words with the same frequency should be printed in lexicographical order

Objective :

To sort the words in descending order based on their occurence.

Code :

```
counter = {}
for i in range(int(input())):
    line = input().split()
    for word in line:
        counter[word] = counter.get(word, 0) + 1
for i in sorted(counter.items(), key=lambda x:(-x[1],x[0])):
    print(i[0])
```

Input :	**Output** :
9	damme
hi	is
hi	name
what is your name	van
my name is bond	bond
james bond	claude
my name is damme	hi
van damme	my
claude van damme	james
jean claude van damme	jean
	what
	your

Inference :

Every word is counted and stored its occurrences and finally all the words are sorted in descending order based on the no. of occurrences.

Statement :

One day, going through old books in the attic, a student Bob found English-Latin dictionary. By that time he spoke English fluently, and his dream was to learn Latin. So finding the dictionary was just in time. Unfortunately, full-fledged language studying process requires also another type of dictionary: Latin-English. For lack of a better way he decided to make a second dictionary using the first one. As you know, the dictionary consists of words, each of which contains multiple translations. For each Latin word that appears anywhere in the dictionary, Bob has to find all its translations (that is, all English words, for which our Latin word is among its translations), and take them and only them as the translations of this Latin word. Help him to create a Latin-English. The first line contains a single integer N — the number of English words in the dictionary. Followed by N dictionary entries. Each entry is contained on a separate line, which contains first the English word, then a hyphen surrounded by spaces and then comma-separated list with the translations of this English word in Latin. All the words consist only of lowercase English letters. The translations are sorted in lexicographical order. The order of English words in the dictionary is also lexicographic. Print the corresponding Latin-English dictionary in the same format. In particular, the first word line should be the lexicographically minimal translation of the Latin word, then second in that order, etc. Inside the line the English words should be sorted also lexicographically.

Objective : To make a Latin to English dictionary.

Code :

```
from collections import defaultdict
latin_to_english = defaultdict(list)
for i in range(int(input())):
    english_word, latin_translations_chunk = input().split(' - ')
    latin_translations = latin_translations_chunk.split(', ')
    for latin_word in latin_translations:
        latin_to_english[latin_word].append(english_word)
print(len(latin_to_english))
for latin_word, english_translations in sorted(latin_to_english.items()):
    print(latin_word + ' - ' + ', '.join(english_translations))
```

Input :	**Output** :
3 apple - malum, pomum, popula fruit - baca, bacca, popum punishment - malum, multa	7 baca - fruit bacca - fruit malum - apple, punishment multa - punishment pomum - apple popula - apple popum - fruit

Inference :

From this program i am able to create a latin to english dictionary using dictionaries data structure.