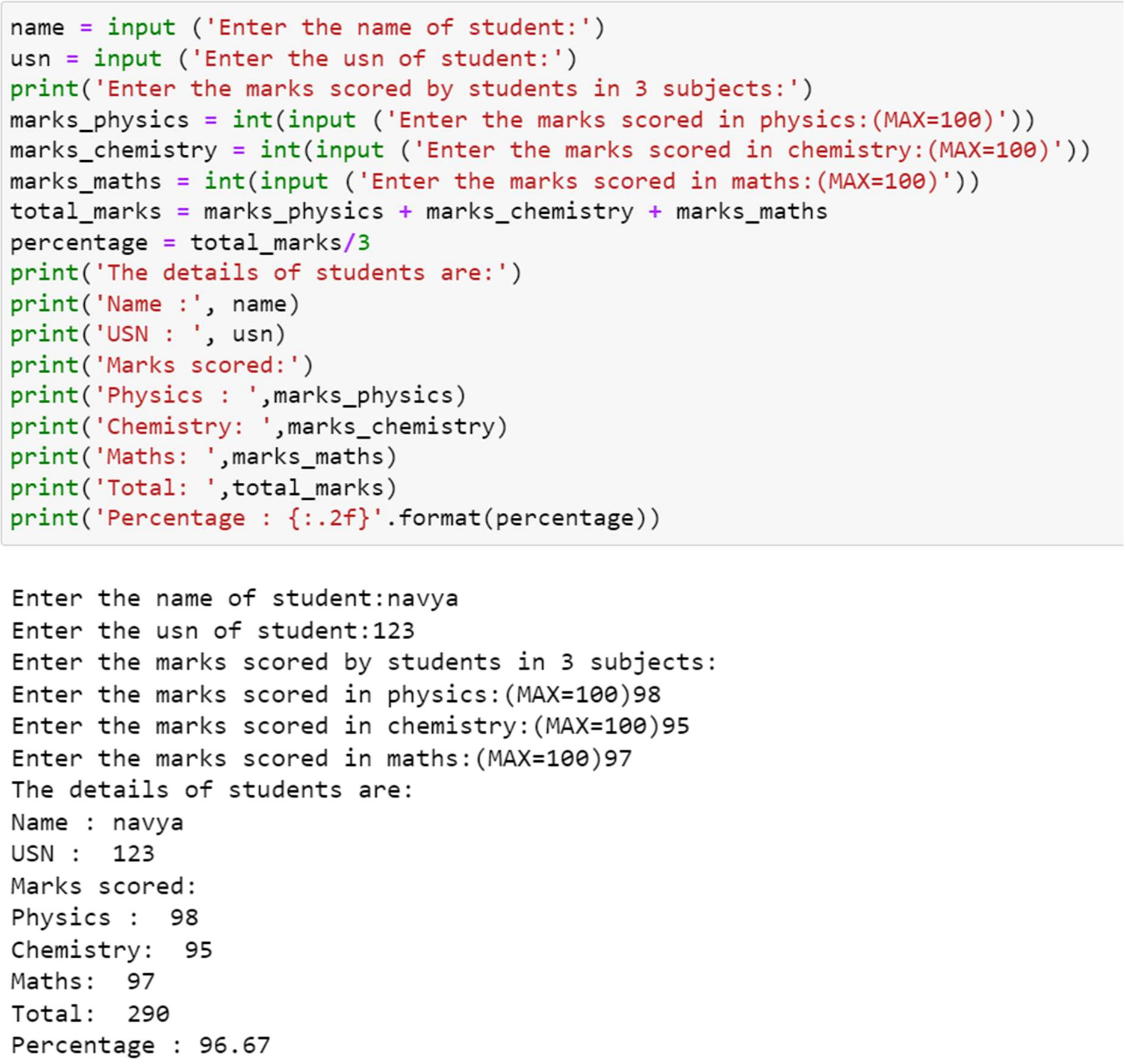
Python Lab Programs

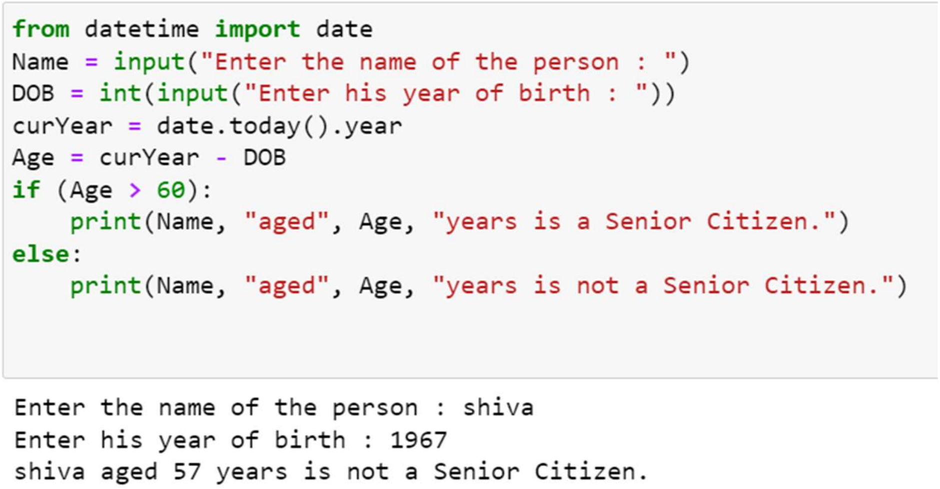
Program 1a: Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.



```
name = input ('Enter the name of student:')
usn = input ('Enter the usn of student:')
print('Enter the marks scored by students in 3 subjects:')
marks_physics = int(input ('Enter the marks scored in physics:(MAX=100)'))
marks_chemistry = int(input ('Enter the marks scored in chemistry:(MAX=100)'))
marks_maths = int(input ('Enter the marks scored in maths:(MAX=100)'))
total_marks = marks_physics + marks_chemistry + marks_maths
percentage = total_marks/3
print('The details of students are:')
print('Name :', name)
print('USN : ', usn)
print('Marks scored:')
print('Physics : ',marks_physics)
print('Chemistry: ',marks_chemistry)
print('Maths: ',marks_maths)
print('Total: ',total_marks)
print('Percentage : {:.2f}'.format(percentage))
```

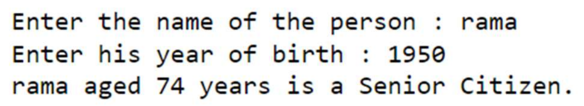
```
Enter the name of student:navya
Enter the usn of student:123
Enter the marks scored by students in 3 subjects:
Enter the marks scored in physics:(MAX=100)98
Enter the marks scored in chemistry:(MAX=100)95
Enter the marks scored in maths:(MAX=100)97
The details of students are:
Name : navya
USN :  123
Marks scored:
Physics :  98
Chemistry:  95
Maths:  97
Total:  290
Percentage : 96.67
```

Program 1b: Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.



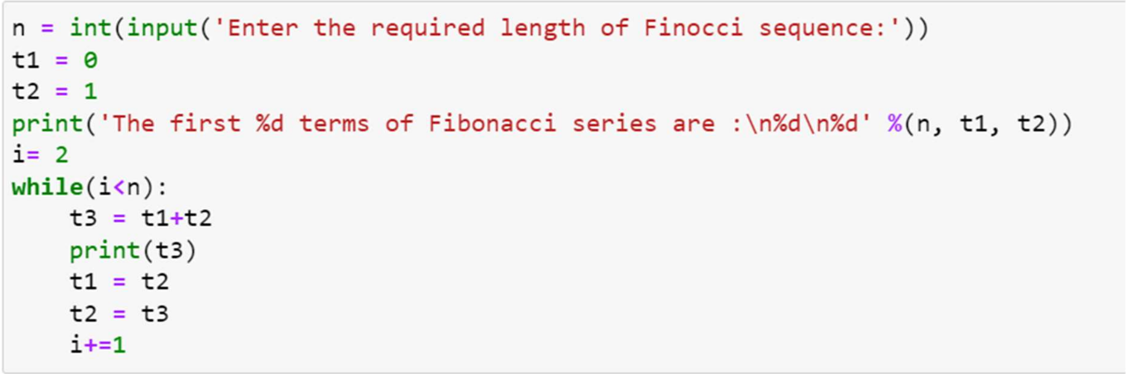
```
from datetime import date
Name = input("Enter the name of the person : ")
DOB = int(input("Enter his year of birth : "))
curYear = date.today().year
Age = curYear - DOB
if (Age > 60):
    print(Name, "aged", Age, "years is a Senior Citizen.")
else:
    print(Name, "aged", Age, "years is not a Senior Citizen.")
```

```
Enter the name of the person : shiva
Enter his year of birth : 1967
shiva aged 57 years is not a Senior Citizen.
```

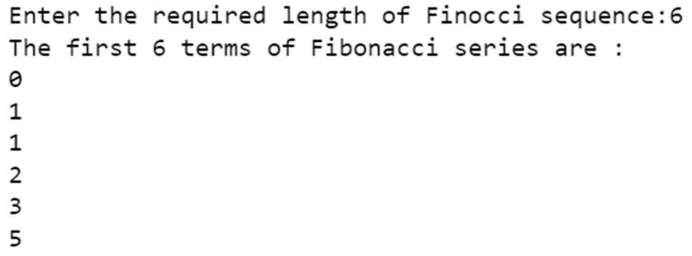


```
Enter the name of the person : rama
Enter his year of birth : 1950
rama aged 74 years is a Senior Citizen.
```

Program 2a: Develop a program to generate a Fibonacci sequence of length (N). Read N from the console.

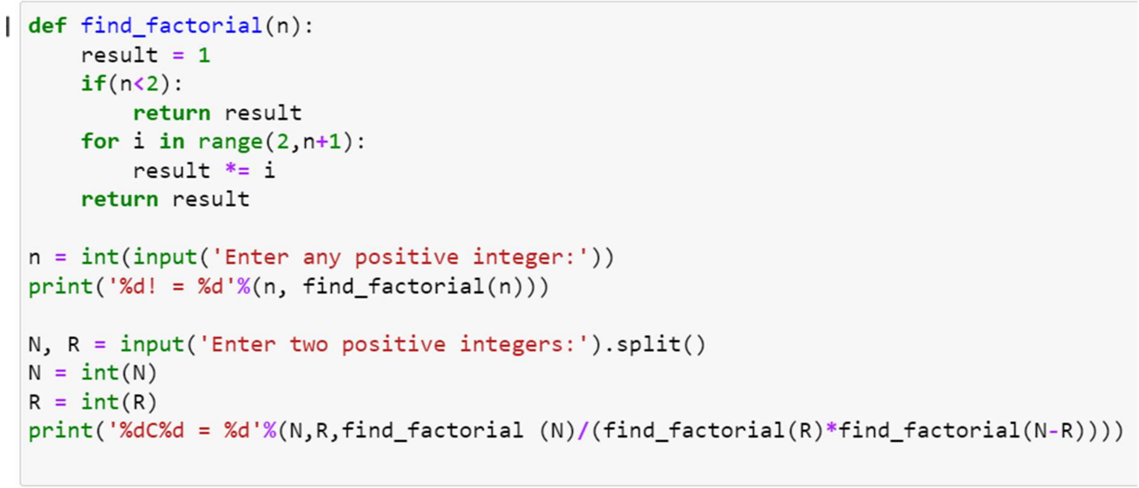


```
n = int(input('Enter the required length of Finocci sequence:'))
t1 = 0
t2 = 1
print('The first %d terms of Fibonacci series are :\n%d\n%d' %(n, t1, t2))
i= 2
while(i<n):
    t3 = t1+t2
    print(t3)
    t1 = t2
    t2 = t3
    i+=1
```

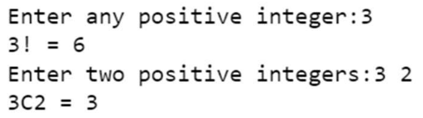


```
Enter the required length of Finocci sequence:6
The first 6 terms of Fibonacci series are :
0
1
1
2
3
5
```

Program 2b: Write a function to calculate the factorial of a number. Develop a program to compute the binomial coefficient (Given N and R).

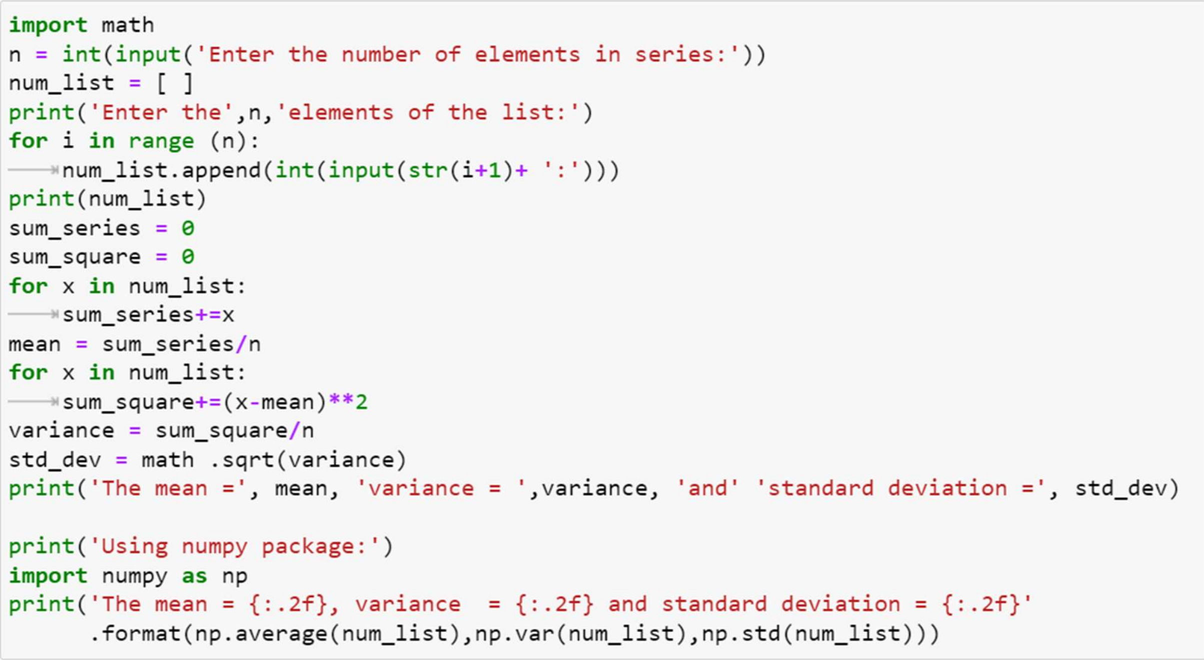


```
def find_factorial(n):
    result = 1
    if(n<2):
        return result
    for i in range(2,n+1):
        result *= i
    return result

n = int(input('Enter any positive integer:'))
print('%d! = %d'%(n, find_factorial(n)))

N, R = input('Enter two positive integers:').split()
N = int(N)
R = int(R)
print('%dC%d = %d'%(N,R,find_factorial (N)/(find_factorial(R)*find_factorial(N-R))))
```

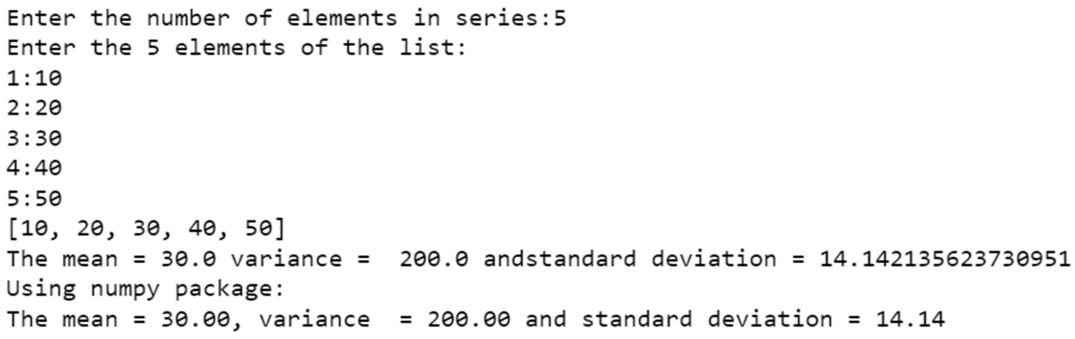


```
Enter any positive integer:3
3! = 6
Enter two positive integers:3 2
3C2 = 3
```

Program 3: Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.

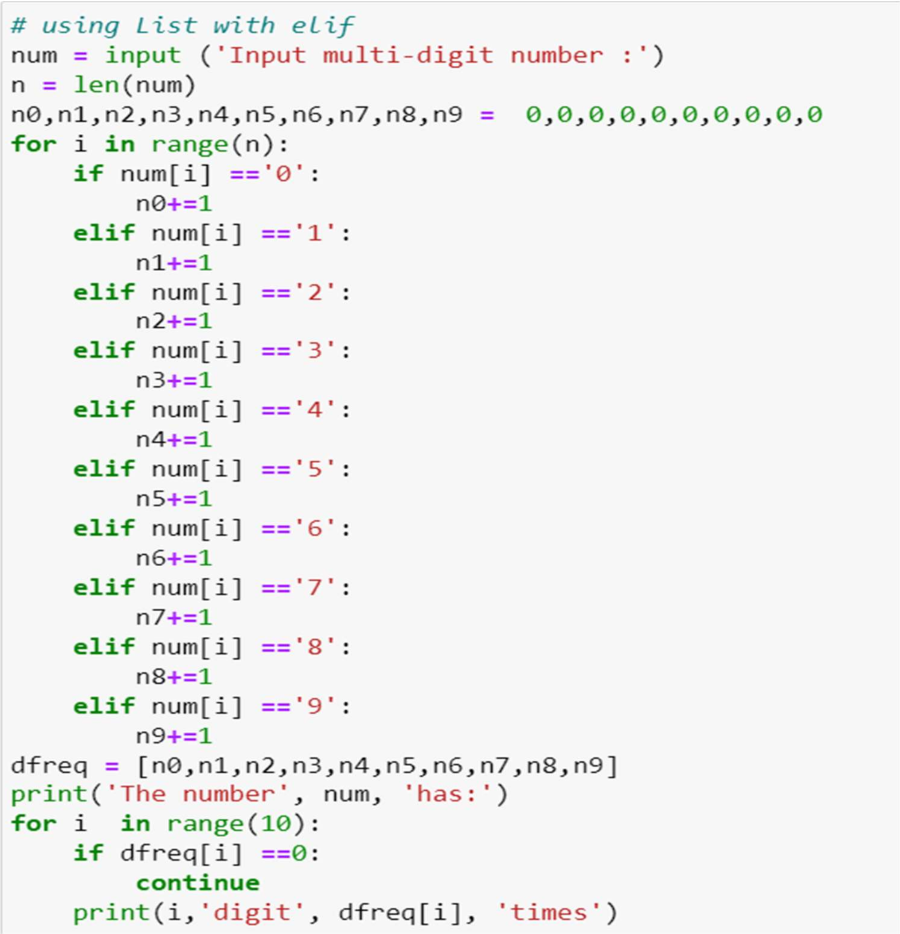


```python
import math
n = int(input('Enter the number of elements in series:'))
num_list = [ ]
print('Enter the',n,'elements of the list:')
for i in range (n):
    num_list.append(int(input(str(i+1)+ ':')))
print(num_list)
sum_series = 0
sum_square = 0
for x in num_list:
    sum_series+=x
mean = sum_series/n
for x in num_list:
    sum_square+=(x-mean)**2
variance = sum_square/n
std_dev = math .sqrt(variance)
print('The mean =', mean, 'variance = ',variance, 'and' 'standard deviation =', std_dev)

print('Using numpy package:')
import numpy as np
print('The mean = {:.2f}, variance  = {:.2f} and standard deviation = {:.2f}'
      .format(np.average(num_list),np.var(num_list),np.std(num_list)))
```

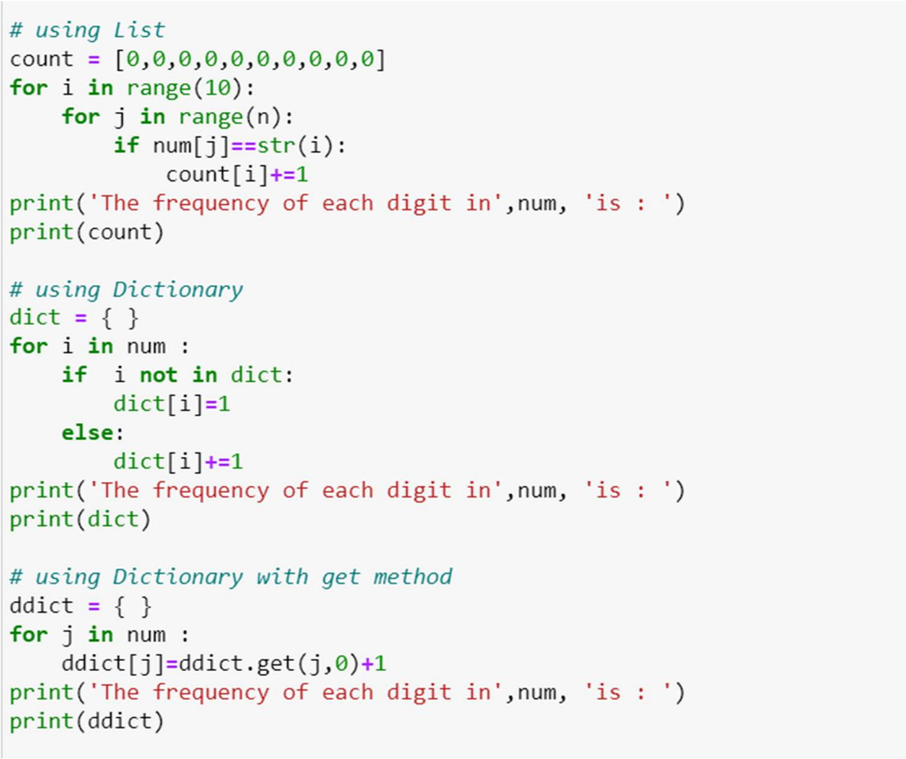


```
Enter the number of elements in series:5
Enter the 5 elements of the list:
1:10
2:20
3:30
4:40
5:50
[10, 20, 30, 40, 50]
The mean = 30.0 variance =  200.0 andstandard deviation = 14.142135623730951
Using numpy package:
The mean = 30.00, variance  = 200.00 and standard deviation = 14.14
```

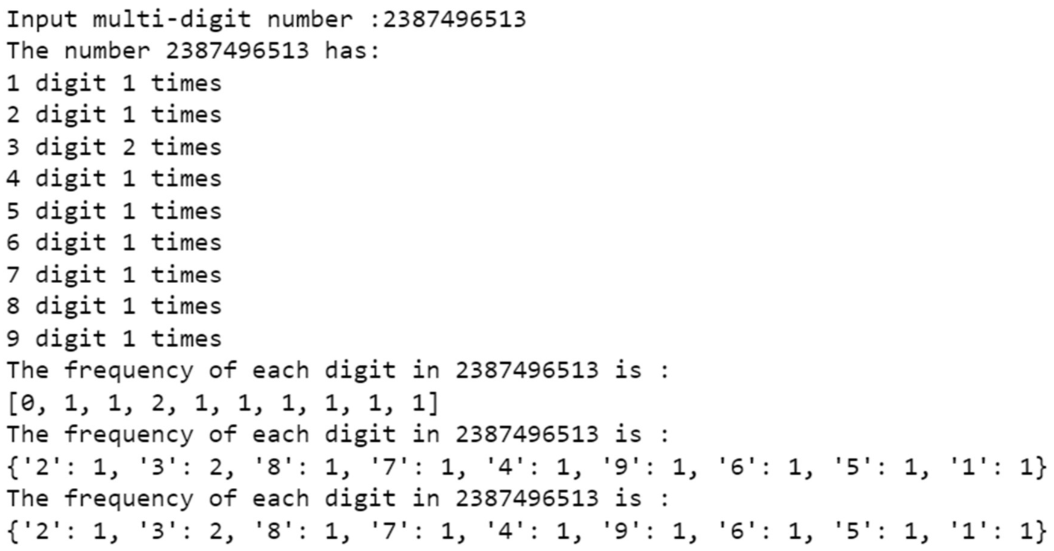
Program 4: Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with a suitable message.



```python
# using List with elif
num = input ('Input multi-digit number :')
n = len(num)
n0,n1,n2,n3,n4,n5,n6,n7,n8,n9 =  0,0,0,0,0,0,0,0,0,0
for i in range(n):
    if num[i] =='0':
        n0+=1
    elif num[i] =='1':
        n1+=1
    elif num[i] =='2':
        n2+=1
    elif num[i] =='3':
        n3+=1
    elif num[i] =='4':
        n4+=1
    elif num[i] =='5':
        n5+=1
    elif num[i] =='6':
        n6+=1
    elif num[i] =='7':
        n7+=1
    elif num[i] =='8':
        n8+=1
    elif num[i] =='9':
        n9+=1
dfreq = [n0,n1,n2,n3,n4,n5,n6,n7,n8,n9]
print('The number', num, 'has:')
for i  in range(10):
    if dfreq[i] ==0:
        continue
    print(i,'digit', dfreq[i], 'times')
```



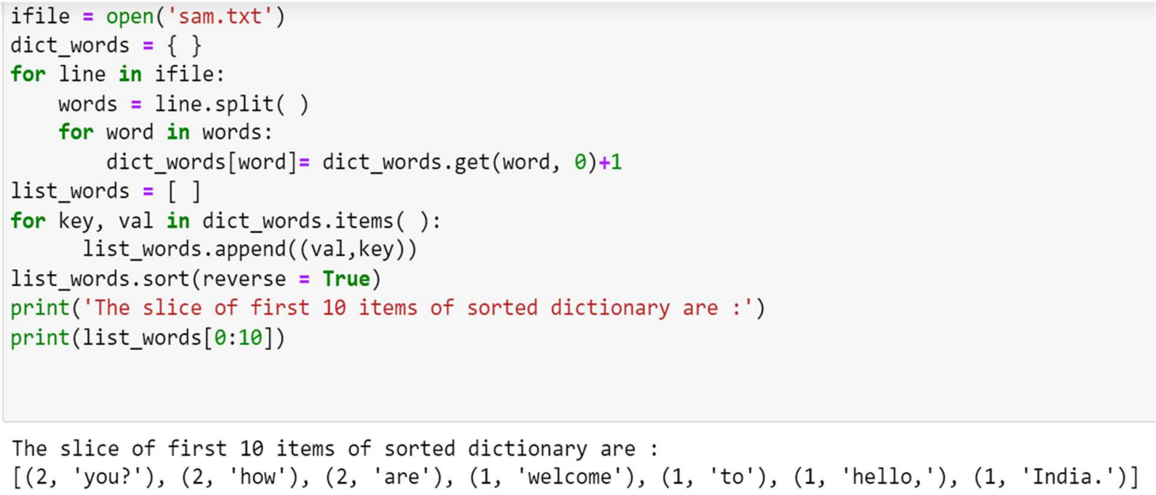
```python
# using List
count = [0,0,0,0,0,0,0,0,0,0]
for i in range(10):
    for j in range(n):
        if num[j]==str(i):
            count[i]+=1
print('The frequency of each digit in',num, 'is : ')
print(count)

# using Dictionary
dict = { }
for i in num :
    if  i not in dict:
        dict[i]=1
    else:
        dict[i]+=1
print('The frequency of each digit in',num, 'is : ')
print(dict)

# using Dictionary with get method
ddict = { }
for j in num :
    ddict[j]=ddict.get(j,0)+1
print('The frequency of each digit in',num, 'is : ')
print(ddict)
```



```
Input multi-digit number :2387496513
The number 2387496513 has:
1 digit 1 times
2 digit 1 times
3 digit 2 times
4 digit 1 times
5 digit 1 times
6 digit 1 times
7 digit 1 times
8 digit 1 times
9 digit 1 times
The frequency of each digit in 2387496513 is :
[0, 1, 1, 2, 1, 1, 1, 1, 1, 1]
The frequency of each digit in 2387496513 is :
{'2': 1, '3': 2, '8': 1, '7': 1, '4': 1, '9': 1, '6': 1, '5': 1, '1': 1}
The frequency of each digit in 2387496513 is :
{'2': 1, '3': 2, '8': 1, '7': 1, '4': 1, '9': 1, '6': 1, '5': 1, '1': 1}
```

Program 5: Develop a program to print 10 most frequently appearing words in a text file.

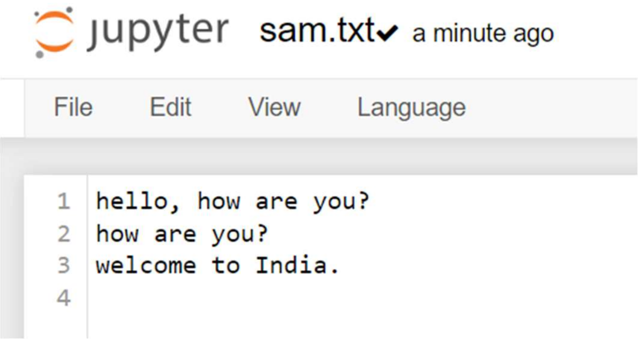
[Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]



```
ifile = open('sam.txt')
dict_words = { }
for line in ifile:
    words = line.split( )
    for word in words:
        dict_words[word]= dict_words.get(word, 0)+1
list_words = [ ]
for key, val in dict_words.items( ):
      list_words.append((val,key))
list_words.sort(reverse = True)
print('The slice of first 10 items of sorted dictionary are :')
print(list_words[0:10])
```

```
The slice of first 10 items of sorted dictionary are :
[(2, 'you?'), (2, 'how'), (2, 'are'), (1, 'welcome'), (1, 'to'), (1, 'hello,'), (1, 'India.')]
```

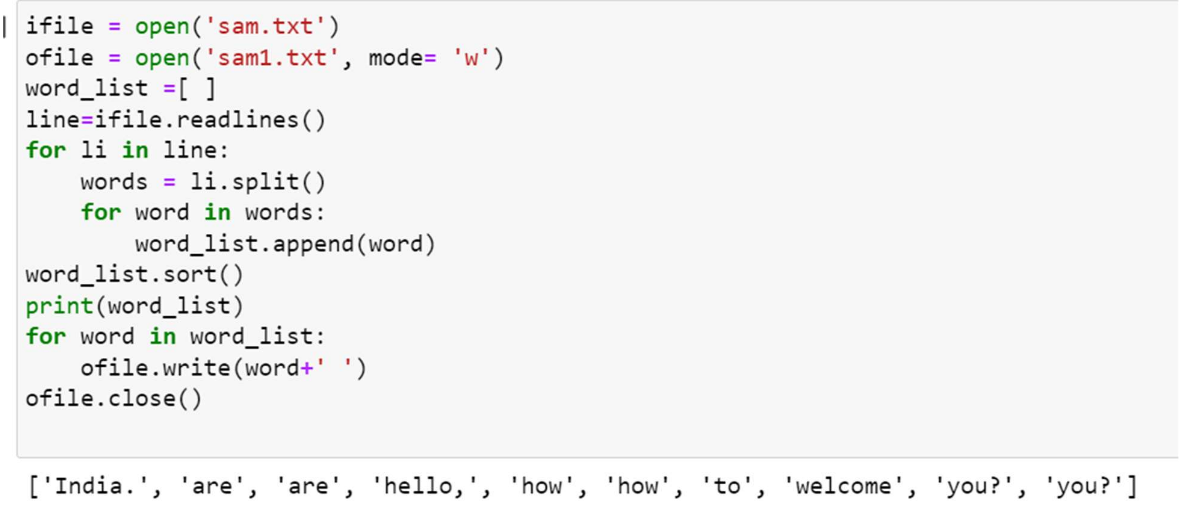
sam.txt



```
hello, how are you?
how are you?
welcome to India.

```

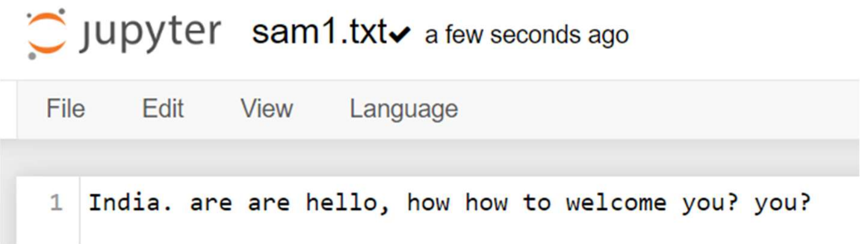
Program 6: Develop a program to sort the contents of a text file and write the sorted contents into a separate text file.

[Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].



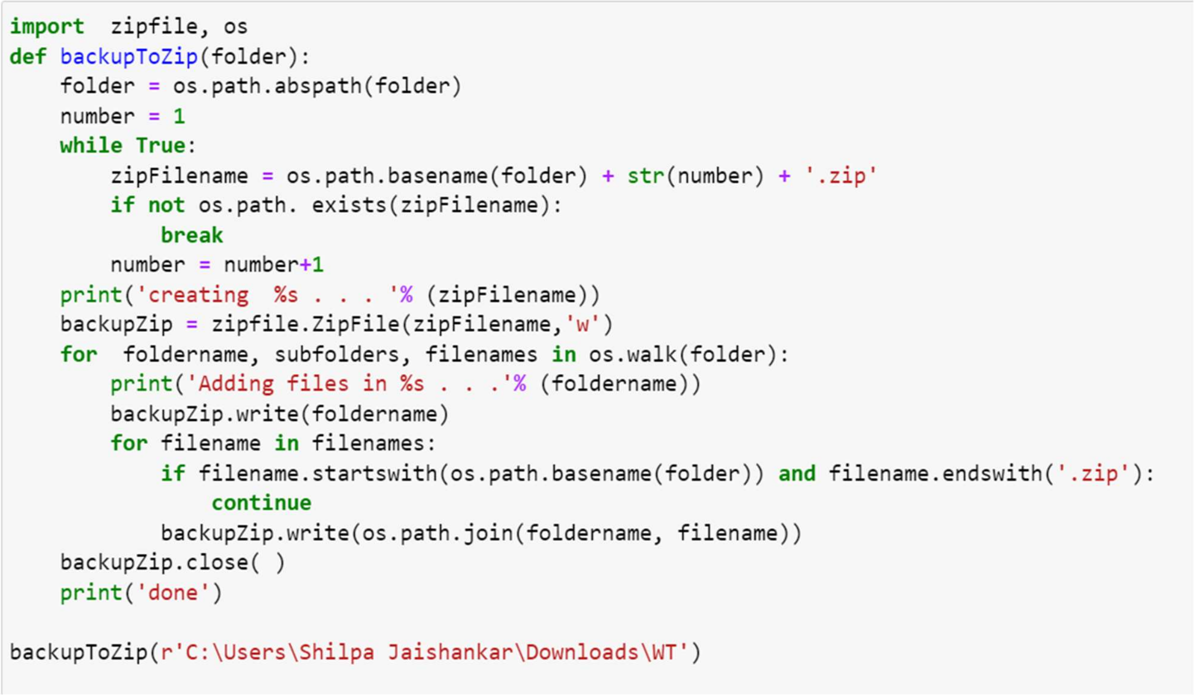
```
ifile = open('sam.txt')
ofile = open('sam1.txt', mode= 'w')
word_list =[ ]
line=ifile.readlines()
for li in line:
    words = li.split()
    for word in words:
        word_list.append(word)
word_list.sort()
print(word_list)
for word in word_list:
    ofile.write(word+' ')
ofile.close()
```

```
['India.', 'are', 'are', 'hello,', 'how', 'how', 'to', 'welcome', 'you?', 'you?']
```

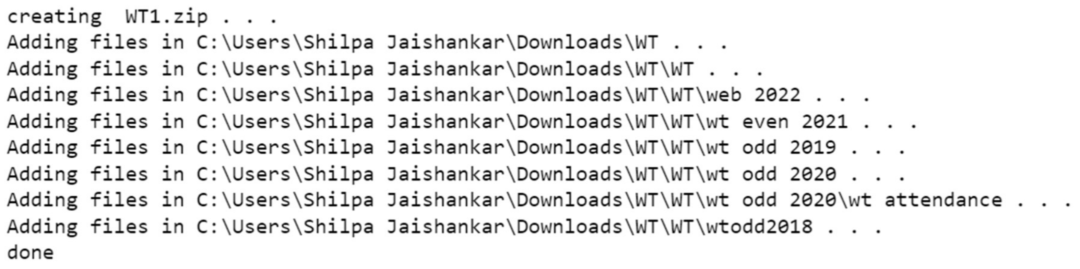


```
India. are are hello, how how to welcome you? you?
```

Program 7: Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.

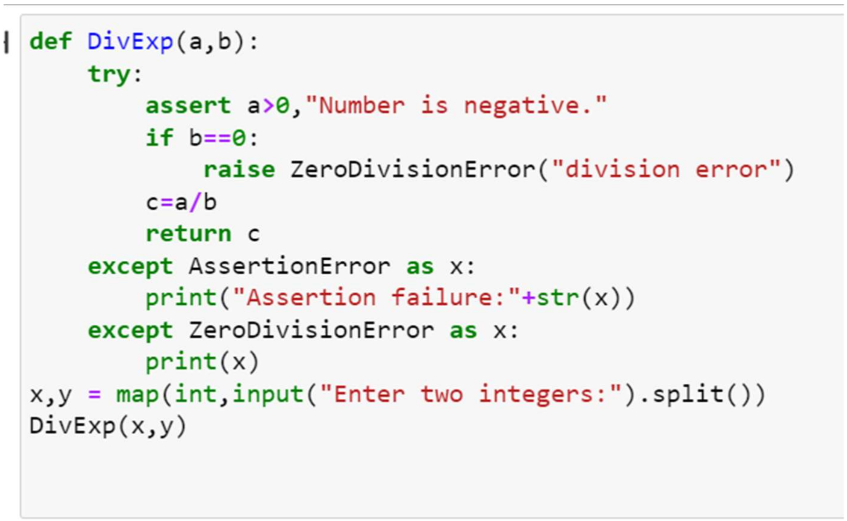


```
import  zipfile, os
def backupToZip(folder):
    folder = os.path.abspath(folder)
    number = 1
    while True:
        zipFilename = os.path.basename(folder) + str(number) + '.zip'
        if not os.path. exists(zipFilename):
            break
        number = number+1
    print('creating  %s . . . '% (zipFilename))
    backupZip = zipfile.ZipFile(zipFilename,'w')
    for  foldername, subfolders, filenames in os.walk(folder):
        print('Adding files in %s . . .'% (foldername))
        backupZip.write(foldername)
        for filename in filenames:
            if filename.startswith(os.path.basename(folder)) and filename.endswith('.zip'):
                continue
            backupZip.write(os.path.join(foldername, filename))
    backupZip.close( )
    print('done')

backupToZip(r'C:\Users\Shilpa Jaishankar\Downloads\WT')
```

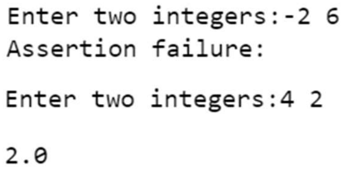


```
creating  WT1.zip . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT\web 2022 . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT\wt even 2021 . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT\wt odd 2019 . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT\wt odd 2020 . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT\wt odd 2020\wt attendance . . .
Adding files in C:\Users\Shilpa Jaishankar\Downloads\WT\WT\wtodd2018 . . .
done
```

Program 8: Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.

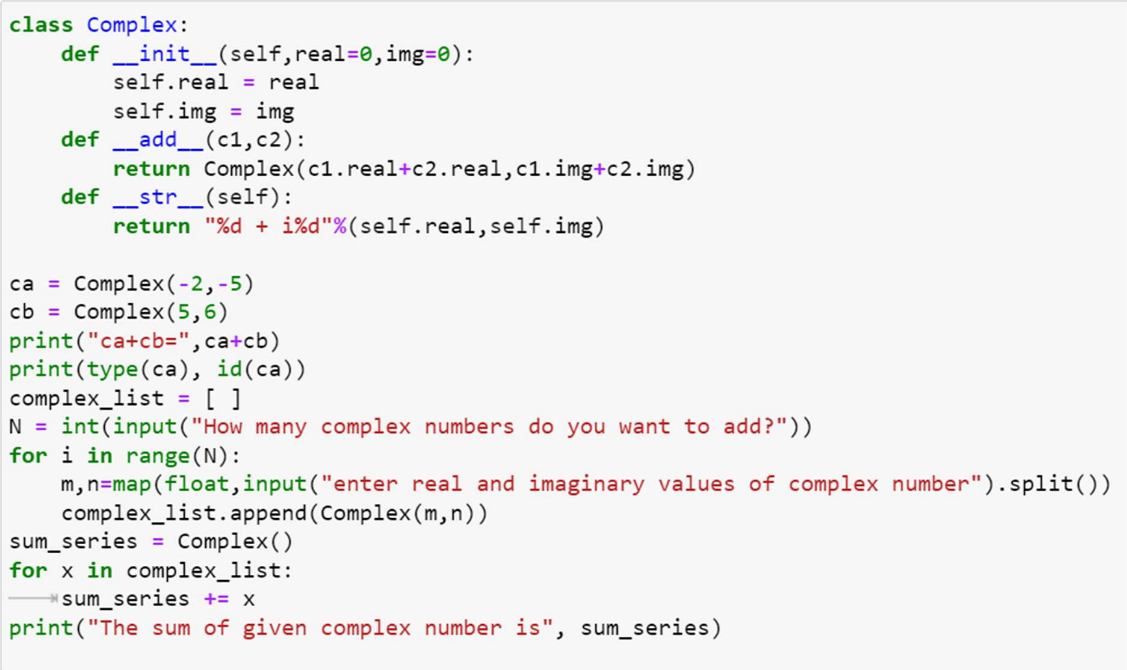


```python
def DivExp(a,b):
    try:
        assert a>0,"Number is negative."
        if b==0:
            raise ZeroDivisionError("division error")
        c=a/b
        return c
    except AssertionError as x:
        print("Assertion failure:"+str(x))
    except ZeroDivisionError as x:
        print(x)
x,y = map(int,input("Enter two integers:").split())
DivExp(x,y)
```

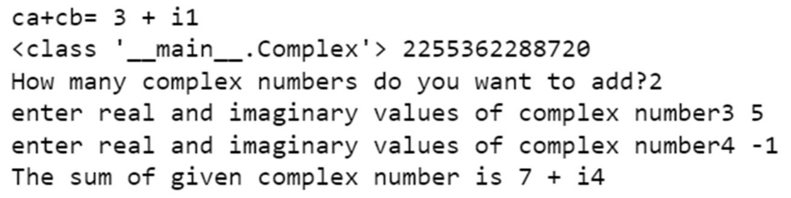


```
Enter two integers:-2 6
Assertion failure:

Enter two integers:4 2

2.0
```

Program 9: Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.



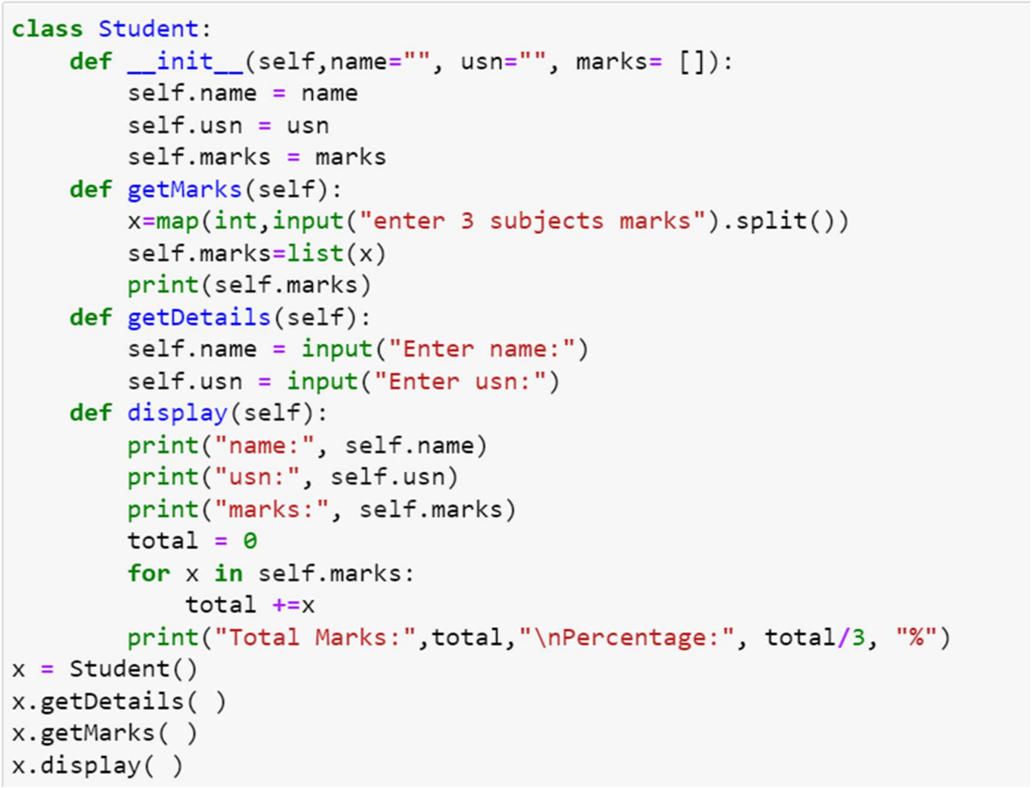
```python
class Complex:
    def __init__(self,real=0,img=0):
        self.real = real
        self.img = img
    def __add__(c1,c2):
        return Complex(c1.real+c2.real,c1.img+c2.img)
    def __str__(self):
        return "%d + i%d"%(self.real,self.img)

ca = Complex(-2,-5)
cb = Complex(5,6)
print("ca+cb=",ca+cb)
print(type(ca), id(ca))
complex_list = [ ]
N = int(input("How many complex numbers do you want to add?"))
for i in range(N):
    m,n=map(float,input("enter real and imaginary values of complex number").split())
    complex_list.append(Complex(m,n))
sum_series = Complex()
for x in complex_list:
    sum_series += x
print("The sum of given complex number is", sum_series)
```



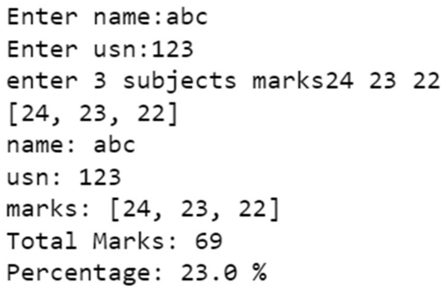
```
ca+cb= 3 + i1
<class '__main__.Complex'> 2255362288720
How many complex numbers do you want to add?2
enter real and imaginary values of complex number3 5
enter real and imaginary values of complex number4 -1
The sum of given complex number is 7 + i4
```

Program 10: Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details.

[Hint: Use list to store the marks in three subjects and total marks. Use _init_() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]



```
class Student:
    def __init__(self,name="", usn="", marks= []):
        self.name = name
        self.usn = usn
        self.marks = marks
    def getMarks(self):
        x=map(int,input("enter 3 subjects marks").split())
        self.marks=list(x)
        print(self.marks)
    def getDetails(self):
        self.name = input("Enter name:")
        self.usn = input("Enter usn:")
    def display(self):
        print("name:", self.name)
        print("usn:", self.usn)
        print("marks:", self.marks)
        total = 0
        for x in self.marks:
            total +=x
        print("Total Marks:",total,"\nPercentage:", total/3, "%")
x = Student()
x.getDetails( )
x.getMarks( )
x.display( )
```



```
Enter name:abc
Enter usn:123
enter 3 subjects marks24 23 22
[24, 23, 22]
name: abc
usn: 123
marks: [24, 23, 22]
Total Marks: 69
Percentage: 23.0 %
```