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1. Write a program to use the mathematical operators.

Source Code:

```
a,b=map(int,input("Enter values of a and b\n").split())
print("The addition of {0} and {1} is : {2}".format(a,b,a+b))
print("The subtraction of {0} from {1} is : {2}".format(a,b,b-a))
print("The multiplication of {0} and {1} is : {2}".format(a,b,a*b))
print("The division of {0} from {1} is : {2}".format(a,b,b/a))
```

Output:

```
Enter values of a and b
8 10
The addition of 8 and 10 is : 18
The subtraction of 8 from 10 is : 2
The multiplication of 8 and 10 is : 80
The division of 8 from 10 is : 1.25
```

2. Write a program to take a input from the user and print the Fibonacci series.

Source Code:

```
def fibo(n):
    if(n==0 or n==1):
        return n
    return (fibo(n-1)+fibo(n-2))


a=int(input("Enter any number: \n"))
for i in range(a):
    print(fibo(i))
```

Output:

```
Enter any number:
5
The fibonacci series:
0
1
1
2
3
```

3. Write a program to find factorial of a number.

Source Code:

```
a=int(input("Enter any number: \n"))
s=1
for i in range(1,a+1):
    s*=i;
print("The factorial of {0} is : {1}".format(a,s))
```

Output:

```
Enter any number:
6
The factorial of 6 is : 720
```

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4. Write a program to check whether a number is prime or not using loops.

Source Code:

```
a=int(input("Enter any number: \n"))
c=0
for i in range(1,a+1):
    if(a%i==0):
        c+=1
if(c==2):
    print("{0} is a prime number".format(a))
else:
    print("{0} is not a prime number".format(a))
```

Output:

```
Enter any number:
7
7 is a prime number
```

5. Write a program to demonstrate the importing of modules in python.

Source Code:

```
import math
 print("The value of pi is", math.pi)
```

Output:

```
"C:\Program Files\Python38\python.exe"
The value of pi is 3.141592653589793
```

6. Write a program to demonstrate the use of nested if statement.

Source Code:

```
a=int(input("Enter any number: \n"))
c=0
for i in range(1,a+1):
    if(a%i==0):
        c+=1
if(c>2):
    if(a%2==0):
        print("{0} is even composite number".format(a))
    else:
        print("{0} is odd composite number".format(a))
else:
    print("{0} is not a composite number".format(a))
```

Output:

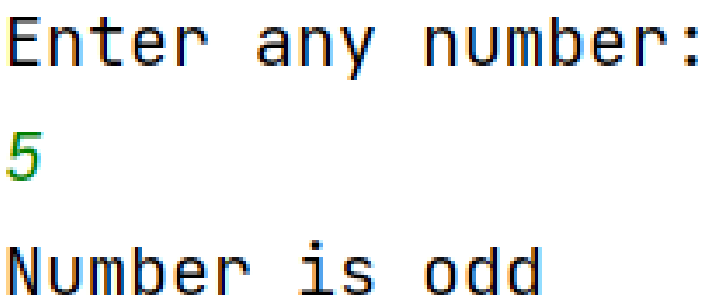
```
Enter any number:
7
7 is not a composite number
```

7. Write a program to demonstrate use of if and else block.

Source Code:

```
a=int(input("Enter any number: \n"))
if(a%2==0):
    print("Number is even")
else:
    print("Number is odd")
```

Output:



8.Write a program to illustrate the usage of tuples.

Source Code:

```
t=(5,3,4,2,4,6)
print(type(t))
for i in t:
    if(i%2==0):
        print("{0} is even".format(i))
    else:
        print("{0} is odd".format(i))
```

Output:

```
<class 'tuple'>
5 is odd
3 is odd
4 is even
2 is even
4 is even
6 is even
```

9. Write a program for searching an element and sorting a list.

Source Code:

```
l=[3,4,6,8,5,1]
a=int(input("Enter element to search: \n"))
i=0
while(i<len(l)):
    if(l[i]==a):
        print("{0} is present at index {1}".format(a,i))
        break
    elif(i==len(l)-1):
        print("Not present")
    i+=1
print("List : ")
print(l)
l.sort()
print("After sorting : ")
print(l)
```

Output:

```
Enter element to search:
5
5 is present at index 4
List :
[3, 4, 6, 8, 5, 1]
After sorting :
[1, 3, 4, 5, 6, 8]
```

10. Write a program to illustrate the use of dictionaries.

Source Code:

```
d={}
print(type(d))
n=int(input("Enter number of students in a class: \n"))
for i in range(n):
    r=int(input("Enter Roll No.: "))
    name=input("Enter name: ")
    d[r]=name
print(d)
```

Output:

```
<class 'dict'>
Enter number of students in a class:
4
Enter Roll No.: 1
Enter name: shubham
Enter Roll No.: 2
Enter name: amit
Enter Roll No.: 3
Enter name: pankaj
Enter Roll No.: 4
Enter name: akash
{1: 'shubham', 2: 'amit', 3: 'pankaj', 4: 'akash'}
```

PROGRAM ON STATISTICAL CONCEPTS AND INTRODUCTION TO LINEAR ALGEBRA USING PYTHON

1. Write a program to find the mean, mode and median of the given range of numbers.

Source Code:

```
l=[]
n=int(input("Enter number of elements: "))
print("Enter the elements: ")
for i in range(n):
    a=int(input())
    l.append(a);
print("The elements are:")
print(l)

l.sort()

print("Mean: {0}".format(sum(l)/n))
if n%2!=0:
    print("Median: {0}".format(l[n//2]))
else:
    print("Median: {0}".format((l[n//2]+l[n//2-1])/2))
max=0
count=0
dict={}
for i in l:
    if i in dict:
        dict[i]+=1;
    else:
        dict[i]=1;
```

```
max=0
for i in dict:
    if(dict[i]>max):
        max=dict[i]
        mode=i;
print("Mode: {0}".format(mode))
```

Output:

```
Enter number of elements: 6
Enter the elements:
1
2
3
9
8
7
The elements are:
[1, 2, 3, 9, 8, 7]
Mean: 5.0
Median: 5.0
Mode: 1
```

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2. Write a program to calculate the standard deviation of a given set of numbers.

Source Code:

```
l=[]
n=int(input("Enter number of elements: "))
print("Enter the elements: ")
for i in range(n):
    a=int(input())
    l.append(a);
print("The elements are:")
print(l)
mean=sum(l)/n;
l1=[];
for i in l:
    a=(mean-i)**2
    l1.append(a)
variance=sum(l1)/n;
std_dev=variance**0.5;
print("Variance: {0}".format(std_dev))
```

Output:

```
Enter number of elements: 6
Enter the elements:
5
8
4
2
9
3
The elements are:
[5, 8, 4, 2, 9, 3]
Variance: 2.544056253745625
```

3. Write a program to calculate the addition of two 3x3 matrices.

Source Code:

```
print("Enter elements of first matrix")
matrix1=[]
for i in range(3):
    l=[]
    for j in range(3):
        a=int(input())
        l.append(a)
    matrix1.append(l)

print("Enter elements of second matrix")
matrix2=[]
for i in range(3):
    l=[]
    for j in range(3):
        a=int(input())
        l.append(a)
    matrix2.append(l)

i=0
j=0
matrix3=[]
while i<3:
    m=[]
    for x in range(3):
        sum=matrix1[i][x]+matrix2[i][x];
        m.append(sum)
    matrix3.append(m)
    i+=1

print("First Matrix: ")
for i in matrix1:
    print(i)
```

```
print("Second Matrix: ")
for i in matrix2:
    print(i)
print("After Addition: ")
for i in matrix3:
    print(i)
```

Output:

```
Enter elements of first matrix
4
8
6
3
2
9
7
4
1
Enter elements of second matrix
5
8
7
4
1
3
6
9
5
```

```
First Matrix:
[4, 8, 6]
[3, 2, 9]
[7, 4, 1]
Second Matrix:
[5, 8, 7]
[4, 1, 3]
[6, 9, 5]
After Addition:
[9, 16, 13]
[7, 3, 12]
[13, 13, 6]
```

4. Write a program to calculate the multiplication of two 3x3 matrices.

Source Code:

```
print("Enter elements of first matrix")
matrix1=[]
for i in range(3):
    l=[]
    for j in range(3):
        a=int(input())
        l.append(a)
    matrix1.append(l)

print("Enter elements of second matrix")
matrix2=[]
for i in range(3):
    l=[]
    for j in range(3):
        a=int(input())
        l.append(a)
    matrix2.append(l)

i=0
j=0
matrix3=[]
for i in range(3):
    lis=[]
    for j in range(3):
        sum=0
        for k in range(3):
            sum+=matrix1[i][k]*matrix2[k][j];
        lis.append(sum)
    matrix3.append(lis)
print("First Matrix: ")
for i in matrix1:
    print(i)
print("Second Matrix: ")
```

```
for i in matrix2:
    print(i)
print("After Multiplication: ")
for i in matrix3:
    print(i)
```

Output:

```
Enter elements of first matrix
4
8
6
3
2
7
8
9
4
Enter elements of second matrix
1
5
8
7
4
5
9
6
3
```

```
First Matrix:
[4, 8, 6]
[3, 2, 7]
[8, 9, 4]
Second Matrix:
[1, 5, 8]
[7, 4, 5]
[9, 6, 3]
After Multiplication:
[114, 88, 90]
[80, 65, 55]
[107, 100, 121]
```

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5. Write a program to inverse a matrix.

Source Code:

```
import numpy as np


a=[]
print("Enter elements of 3x3 matrix: ")
for i in range(3):
    l=[]
    for j in range(3):
        b=int(input());
        l.append(b)
    a.append(l)
print("The inverse of the matrix is: ")
print(np.linalg.inv(a))
```

Output:

```
Enter elements of 3x3 matrix:
7
5
8
4
6
3
2
1
4
The inverse of the matrix is:
[[ 0.63636364 -0.36363636 -1.        ]
 [-0.3030303   0.36363636  0.33333333]
 [-0.24242424  0.09090909  0.66666667]]
```

6. Write a program to calculate the transpose of the given matrix.

Source Code:

```
print("Enter elements of matrix")
matrix1=[]
for i in range(3):
    l=[]
    for j in range(3):
        a=int(input())
        l.append(a)
    matrix1.append(l)

print("Matrix: ")
for i in matrix1:
    print(i)

for i in range(3):
    for j in range(3):
        if(j>i):
            temp=matrix1[i][j]
            matrix1[i][j]=matrix1[j][i]
            matrix1[j][i]=temp;

print("Transpose of Matrix: ")
for i in matrix1:
    print(i)
```

Output:

```
Enter elements of matrix
4
8
6
3
2
1
4
7
5
Matrix:
[4, 8, 6]
[3, 2, 1]
[4, 7, 5]
Transpose of Matrix:
[4, 3, 4]
[8, 2, 7]
[6, 1, 5]
```