**Practical 5 (Lists)**

1. List1= [4,'november',['India',10,7]]  
   print(List1)
2. len(List1)
3. List1[0]
4. list1[2]

2) L1=[7,'Delhi',9,7]  
print(L1)

L1.append('Maharashtra')  
print(L1)

L1.insert(1,'pune')  
print(L1)

L1.remove('Delhi')  
print(L1)

3) L2= range(10)  
for i in L2:  
 print(i,',',end='')  
 print(L2)

L3= range(3,9)  
for i in L3:  
 print(i,',',end='')  
 print(L3)

L4= range(1,10,2)  
for i in (L4):  
 print(i, ',', end='')  
 print(L4)

**Practical -6 (While loop)**

1. i=1  
   while i<=10:  
    print(i)  
    i=i+1
2. j=2  
   while j<=20:  
    print(j)  
    j=j+2
3. k=20  
   while k>=20:  
    print(k)  
    k=k-1
4. sum =0  
   n=1  
   while n<=10:  
    sum = sum+n  
    n=n+1  
    print("sum of first",n-1,"natural numbers =",sum)
5. n=1  
   while n<=5:  
    print("square of ",n,"is:",n\*\*2)  
    n=n+1

**Practical – 7**

for i in "practicals":  
 print(i)

2) for n in range(1,5):  
 print(n)  
   
   
3) for n in range(1,11):  
 print(n\*\*2)

4) n= int(input("table of "))  
 for i in range(1,11):  
 print(n\*i)

5) import math  
for i in [1,16,81,121,169]:  
 print(math.sqrt(i))

**Practical 8**

**>>> a= "Maharashtra"**

**>>> type(a)**

**<class 'str'>**

**>>> b=9.735**

**>>> type(b)**

**<class 'float'>**

**>>> c=[7,3,5]**

**>>> type(c)**

**<class 'list'>**

**>>> d=(4,9,25)**

**>>> type(d)**

**<class 'tuple'>**

**>>> r={'p':16,'R':18,'K':19}**

**>>> type(r)**

**<class 'dict'>**

**>>> p={'2','3','4','6','7'}**

**>>> type(p)**

**<class 'set'>**

**2)** **>>> int(9.87)**

**9**

**3) >>> str(6.87)**

**'6.87'**

**4) >>> float(45)**

**45.0**

**5) >>> str(98)**

**'98'**

**Practical – 9 (if, elif and else statements)**

a=0  
if a>0:  
 print("positive")  
elif a<0:  
 print("negative")  
else:  
 print("is neither positive nor negative")

a=int(input("enter the value: "))  
if a%2==0:  
 print(a,"even")  
 print("smart")  
else:  
 print(a, "odd")

2) a=-10  
if a>0:  
 print("positive")  
else:  
 print("negative")

3) a= 108  
if a%2==0:  
 print("even")  
else:  
 print("odd")

4) Name: input("Name of the student:")  
marks=int(input("Enter the value: "))  
if marks>=60:  
 print("First Div")  
elif marks>=48:  
 print("Second Div")  
elif marks>=35:  
 print("Third Div")  
else:  
 print("Fail")

**Practical 10**

1. from sympy import\*

Matrix([[1,2,3]])

1. from sympy import\*

x=Matrix([[2,5,-5,7]])

7\*x

1. from sympy import\*

x=Matrix([[2,7,-5,7]])

y=Matrix([[6,9,0,8]])

x+y

1. from sympy import\*

x=Matrix([[2,7,-5,7]])

y=Matrix([[6,9,0,8]])

x-3\*y

1. from sympy import\*

x=Matrix([[2,7,-5,7]])

y=Matrix([[6,9,0,8]])

10\*x+4\*y

1. from sympy import\*

Matrix([[2],[7],[5],[7]])

1. from sympy import\*

x=Matrix([[2],[7],[5],[7]])

y=Matrix([[1],[7],[4],[6]])

-4\*x

1. from sympy import\*

x=Matrix([[2],[7],[5],[7]])

y=Matrix([[1],[7],[4],[6]])

7\*x - 3\*y

1. from sympy import\*

x=Matrix([[2,4,5],[7,0,1],[5,7,-1],[7,6,-1]])

x

x.shape

1. i) from sympy import\*

eye(5)

ii) from sympy import\*

zeros(5,3)

iii) from sympy import\*

ones(5,3)

iv) from sympy import\*

diag(9,-5,3)

**Practical -11**

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

A+B

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

A-5\*B

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

-7\*A

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

A\*B

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

A.inv()

B.inv()

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

A\*\*3

B\*\*4

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A

B=Matrix([[2,-3,0],[-5,7,9],[3,17,6]])

B

A.T

B.T

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A.det()

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A.rref

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A.columnspace()

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

A.rank()

1. from sympy import\*

B=Matrix([[2,-3,0,-1],[-5,6,9,1],[3,17,6,9]])

B

B.nullspace()

1. from sympy import\*

x,y,z=symbols("x,y,z")

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

b=([5,-8,10])

linsolve((A,b), [x,y,z])

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

B=Matrix ([5,-8,10])

A.gauss\_jordan\_solve(B)

1. from sympy import\*

A=Matrix([[5,1,0],[5,7,9],[3,7,0]])

L,U,\_= A.LUdecomposition()

L

U

L\*U

**Practical – 12**

1. from sympy import\*

A=Matrix([[4,2,2],[2,4,2],[2,2,4]])

A.eigenvals()

1. from sympy import\*

A=Matrix([[4,2,2],[2,4,2],[2,2,4]])

A.eigenvals()

A.eigenvects()

1. from sympy import\*

A=Matrix([[1,3,3],[2,2,3],[4,2,1]])

A.diagonalize()

1. from sympy import\*

A=Matrix([[0,1,0],[0,0,1],[0,0,3]])

A.is\_diagonalizable()