

NAME = RUSHI DAULATKAR

ROLL NO = 53

EXPERIMENT NUMBER = 2

AIM = TO STUDY BASIC OF OBTAINING SOLUTION FOR SYSTEM OF LINEAR EQUATION .

RANK :

```
In [45]: B = matrix([[10,2,13],[5,4,6],[-4,21,70]])
          B.rank()
```

Out[45]: 3

UPPER TRIANGULAR :

```
In [41]: B = matrix([[ -5,2,6],[4,3,5],[1,4,6]])
          upper_triangular_matrix = B.echelon_form().transpose()
          print("matrix B = ")
          show(B)
          print("upper triangular matrix =")
          show(upper_triangular_matrix)
          print("rank =")
          print(upper_triangular_matrix.rank())
```

Out[41]: matrix B =

$$\begin{pmatrix} -5 & 2 & 6 \\ 4 & 3 & 5 \\ 1 & 4 & 6 \end{pmatrix}$$

upper triangular matrix =

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 4 & 13 & 50 \end{pmatrix}$$

rank =
3

LOWER TRIANGULAR =

```
In [42]: C = matrix([[4,6,8],[1,2,3],[-5,4,9]])
          lower_triangular_matrix = C.echelon_form().transpose()
          print("matrix C = ")
          show(C)
          print("lower triangular matrix =")
          show(lower_triangular_matrix)
          print("rank =")
          print(lower_triangular_matrix.rank())
```

Out[42]: matrix C =

$$\begin{pmatrix} 4 & 6 & 8 \\ 1 & 2 & 3 \\ -5 & 4 & 9 \end{pmatrix}$$

lower triangular matrix =

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 3 & 0 & 4 \end{pmatrix}$$

rank =
3

PERMUTATION =

```
In [46]: Q = matrix([[4,3,7],[1,3,5],[-5,4,9]])
p,l,u=Q.LU()
show("upper triangular of Q =",u)
show("lower triangular of Q =",l)
show("permutation triangular of Q =",p)
print("rank=",Q.rank())
```

```
Out[46]: upper triangular of Q =  $\begin{pmatrix} -5 & 4 & 9 \\ 0 & \frac{31}{5} & \frac{71}{5} \\ 0 & 0 & -\frac{59}{31} \end{pmatrix}$ 

lower triangular of Q =  $\begin{pmatrix} 1 & 0 & 0 \\ -\frac{4}{5} & 1 & 0 \\ -\frac{1}{5} & \frac{19}{31} & 1 \end{pmatrix}$ 

permutation triangular of Q =  $\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$ 

rank= 3
```

DIAGONAL =

```
In [44]: R = matrix([[1,2,6],[5,4,5],[3,6,7]])
R.diagonal()
```

```
Out[44]: [1, 4, 7]
```

CONCLUSION =THE STUDY OF BASIC OF OBTAINING SOLUTION FOR SYSTEM OF LINEAR EQUATION IS SUCCESSFULLY VERIFIED.