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ROLL NO = 58

EXPERIMENT NUMBER = 2

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

RANK :

```
In [39]: A = matrix([[10,2,13],[5,4,6],[-4,21,70]])
A.rank()
```

Out[39]: 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 [43]: 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())
```

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Out[43]: 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.

