

```
In [1]: from sympy import*
```

Q1.Find inverse of any 3x3 matrix

```
In [2]: A=Matrix([[2,3,4],[6,9,8],[5,3,1]])
A
```

```
Out[2]: 
$$\begin{bmatrix} 2 & 3 & 4 \\ 6 & 9 & 8 \\ 5 & 3 & 1 \end{bmatrix}$$

```

```
In [4]: A.inv()
```

```
Out[4]: 
$$\begin{bmatrix} \frac{5}{12} & -\frac{1}{4} & \frac{1}{3} \\ -\frac{17}{18} & \frac{1}{2} & -\frac{2}{9} \\ \frac{3}{4} & -\frac{1}{4} & 0 \end{bmatrix}$$

```

Q2.Find the inverse of matrix by row reduction methodm

```
In [6]: A=Matrix([[1,3,4],[5,0,8],[3,8,9]])
A
```

```
Out[6]: 
$$\begin{bmatrix} 1 & 3 & 4 \\ 5 & 0 & 8 \\ 3 & 8 & 9 \end{bmatrix}$$

```

```
In [7]: augmented_matrix=A.row_join(eye(A.shape[0]))
```

```
In [8]: rref_matrix,pivot_columns=augmented_matrix.rref()
```

```
In [10]: inverse_matrix=rref_matrix[:,A.shape[1]:]
inverse_matrix
```

```
Out[10]: 
$$\begin{bmatrix} -\frac{64}{33} & \frac{5}{33} & \frac{8}{11} \\ -\frac{7}{11} & -\frac{1}{11} & \frac{4}{11} \\ \frac{40}{33} & \frac{1}{33} & -\frac{5}{11} \end{bmatrix}$$

```

Q3.Find inverse by adjoint method

```
In [18]: A=Matrix([[3,1,4],[7,1,3],[4,3,0]])
A
```

```
Out[18]: 
$$\begin{bmatrix} 3 & 1 & 4 \\ 7 & 1 & 3 \\ 4 & 3 & 0 \end{bmatrix}$$

```

```
In [20]: B=A.adjoint()
```

```
In [21]: B.inv()
```

Out[21]:

$$\begin{bmatrix} -\frac{9}{53} & \frac{12}{53} & \frac{17}{53} \\ \frac{12}{53} & -\frac{16}{53} & -\frac{5}{53} \\ -\frac{1}{53} & \frac{19}{53} & -\frac{4}{53} \end{bmatrix}$$

Q4.Find inverse of matrix by adjoint method

In [22]: `A=Matrix([[2,1,7],[6,1,3],[4,3,9]])`  
A

Out[22]:

$$\begin{bmatrix} 2 & 1 & 7 \\ 6 & 1 & 3 \\ 4 & 3 & 9 \end{bmatrix}$$

In [23]: `B=A.adjoint()`  
`B.inv()`

Out[23]:

$$\begin{bmatrix} 0 & -\frac{3}{4} & \frac{1}{4} \\ \frac{3}{14} & -\frac{5}{28} & -\frac{1}{28} \\ -\frac{1}{14} & \frac{9}{14} & -\frac{1}{14} \end{bmatrix}$$

Q5.Find inverse of given matrix if exist

In [24]: `A=Matrix([[1,3,4],[5,0,8],[3,8,9]])`  
`B=A.det()`  
`if B==0:`  
    `print("inverse of given matrix is not exist because det=0")`  
`else:`  
    `C=(A.inv())`  
    (C)

Out[24]:

$$\begin{bmatrix} -\frac{64}{33} & \frac{5}{33} & \frac{8}{11} \\ -\frac{7}{11} & -\frac{1}{11} & \frac{4}{11} \\ \frac{40}{33} & \frac{1}{33} & -\frac{5}{11} \end{bmatrix}$$

In [ ]: