

## Determinant

1) solve :  $\begin{vmatrix} x & 2 \\ 8 & 4 \end{vmatrix} = \begin{vmatrix} 1 & 1 \\ 2 & 2 \end{vmatrix}$

2) solve :  $\begin{vmatrix} x & 4 & -4 \\ 3 & -2 & 1 \\ -2 & -4 & 1 \end{vmatrix} = 0$

3) Solve :  $\begin{vmatrix} 2 & -3 \\ 4 & 3 \end{vmatrix} = \begin{vmatrix} x & 1 \\ -2 & x \end{vmatrix}$

4) Find  $x$  if  $\begin{vmatrix} x & 8 \\ 2 & x \end{vmatrix} = 0$

5) Find value of  $k$  if :  $\begin{vmatrix} 2 & -k & 7 \\ 3 & -4 & 13 \\ 8 & -11 & 33 \end{vmatrix} = 0$

6) Find value of  $x$  if :  $\begin{vmatrix} 0 & 7 & -2 \\ 11 & x & 10 \\ 4 & 8 & 1 \end{vmatrix} = 0$

7) Find value of  $x$  if :  $\begin{vmatrix} 2 & 3 & 1 \\ 6 & x & 2 \\ 4 & x & -2 \end{vmatrix} = 0$

8) Find value of  $x$  if :  $\begin{vmatrix} 4 & 3 & 9 \\ 3 & -2 & 7 \\ 11 & 4 & x \end{vmatrix} = 0$

9) Find value of  $x$  if :  $\begin{vmatrix} 1 & x & x^2 \\ 1 & 2 & 4 \\ 1 & 3 & 9 \end{vmatrix} = 0$

10) Expand the determinant  $\begin{vmatrix} 3 & -5 & -1 \\ 1 & 3 & 5 \\ -5 & 1 & 3 \end{vmatrix}$

11) Find the value of determinant  $\begin{vmatrix} 2 & 3 & 5 \\ 1 & 4 & 2 \\ 3 & 1 & 6 \end{vmatrix}$

12) solve using crammers rule:  $X + Y + Z = 6, 3X + 3Y + Z = 12, 2X + 3Y + 2Z = 14.$

13) solve using crammers rule:  $X + Z = 4, Y + Z = 2, X + Y = 0.$

14) The voltage in an electric circuit are related by following eqn.

15)  $V_1 + V_2 + V_3 = 9, V_1 - V_2 + V_3 = 3, V_1 + V_2 - V_3 = 1$  Find  $V_1, V_2, V_3$ .

16) solve using crammers rule:  $\frac{x}{4} - \frac{y}{3} + \frac{z}{2} = 5, \frac{x}{3} + \frac{y}{2} - \frac{z}{5} = 11, \frac{x}{7} - \frac{y}{9} + \frac{z}{6} = -2.$

17) solve using crammers rule:  $X + Y + Z = 4, 2X + Y + Z = 1, X - Y + Z = 0.$

18) solve using crammers rule:  $\frac{5}{x+2} + \frac{3}{y+1} = 2, \frac{10}{x+2} - \frac{3}{y+1} = 1.$

19) solve using crammers rule:  $2X + Y + Z = 11, 3X - 2Y - Z + 4 = 0, X + 3Y + 2Z = 19.$

20) solve using crammers rule:  $X - 2Y + 3Z = 4, 2X + Y - 3Z = 5, -X + Y + 2Z = 3.$

### Matrices

if  $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$  Find  $2A + 3B - 5I$

if  $A = \begin{bmatrix} -1 & 3 & 4 \\ 5 & 0 & -2 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & -2 & 1 \\ -1 & 0 & -1 \end{bmatrix}, C = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 4 & -3 \end{bmatrix}$

Compute the matrix  $2A + 3B - 4c$

if  $A = \begin{bmatrix} -1 & 2 & -3 \\ 0 & 1 & -2 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & 5 & -6 \\ 3 & 1 & 2 \end{bmatrix}, C = \begin{bmatrix} 5 & -1 & -1 \\ 2 & 3 & -1 \end{bmatrix}$

Find matrix  $X$  such that  $3A + 2B - X = C$

if  $A = \begin{bmatrix} 3 & 2 \\ 1 & -1 \\ 0 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & -1 \\ 3 & 2 \\ 4 & -2 \end{bmatrix}$ , Verify that  $(A + B) = (B + A)$

Find  $x$  and  $y$  satisfying the eqn.  $\begin{bmatrix} 2 & x & -3 \\ y & 5 & 4 \end{bmatrix} + \begin{bmatrix} 5 & -2 & 3 \\ 1 & -2 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 1 & 0 \\ -1 & 3 & 6 \end{bmatrix}$

Prove that the matrix  $A = \begin{bmatrix} 1 & 4 \\ 6 & 9 \end{bmatrix}$  is nonsingular.

Find the matrix  $X$  such that  $\begin{bmatrix} 4 & 5 \\ -3 & 6 \end{bmatrix} + X =$  Prove that the matrix  $\begin{bmatrix} 10 & -1 \\ 0 & -6 \end{bmatrix}$

Find the value of  $a, b$  if Prove that the matrix  $\begin{bmatrix} a - 4b & 5 \\ 6 & -a + b \end{bmatrix} = \begin{bmatrix} 11 & 5 \\ 6 & -5 \end{bmatrix}$

if  $A = \begin{bmatrix} 4 & 1 \\ 5 & 2 \\ 3 & -4 \end{bmatrix}, \begin{bmatrix} 1 & -6 & 4 \\ 2 & 0 & 3 \end{bmatrix}$  Find the matrix  $AB$  and witoute computing  $BA$  show that  $AB \neq BA$

if  $A = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$ , Find  $A^2 - 9A + 14I$  where  $I$  is unit matrix.

if  $A = \begin{bmatrix} 1 & -2 & 3 \\ -1 & 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 2 & 3 \\ 3 & 1 \\ 1 & 2 \end{bmatrix}$ , Find the matrix  $AB - 3I$  where  $I$  is unit matrix.

if  $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$  Show that  $A^2 = A$

if  $A = \begin{bmatrix} 0 & 1 & -1 \\ 3 & -2 & 3 \\ 2 & -2 & 3 \end{bmatrix}$  Show that  $A^2 = I$

if  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & -3 & 2 \\ -3 & 3 & -1 \\ 2 & -1 & 0 \end{bmatrix}$  Verify that  $AB = I$ .

if  $A = \begin{bmatrix} 7 & 0 & 2 \\ 1 & 2 & 6 \\ 4 & 5 & 3 \end{bmatrix}$ , Find whether matrix  $A$  is singular or nonsingular

if  $A = \begin{bmatrix} -2 & 0 & 1 \\ 1 & 2 & 3 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 1 \\ 2 & 3 \\ 1 & 1 \end{bmatrix}$  Show that  $AB$  is nonsingular

if  $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$  Show that  $A^2 - 8A$  is scalar matrix

if  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$  Show that  $A^2 - 4A$  is scalar matrix

if  $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$ ,  $C = \begin{bmatrix} -3 & 1 \\ 2 & 0 \end{bmatrix}$  Verify that  $A(B + C) = AB + AC$

if  $A = \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} -1 & 5 \\ 4 & -3 \end{bmatrix}$ ,  $C = \begin{bmatrix} 7 & -5 \\ 0 & 5 \end{bmatrix}$  Verify that  $(AB)C = A(BC)$

if  $A = \begin{bmatrix} 2 & 1 & -1 \\ 3 & 1 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 1 \\ 2 & 0 \\ 3 & -1 \end{bmatrix}$ ,  $C = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$  Verify that  $(AB)C = A(BC)$

Find  $x$  and  $y$  if  $\left\{ 4 \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 3 \end{bmatrix} - 2 \begin{bmatrix} 1 & 3 & -1 \\ 2 & -3 & 4 \end{bmatrix} \right\} \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

Find  $x, y$  and  $z$  if  $\left\{ 3 \begin{bmatrix} 3 & 1 \\ 4 & 0 \\ 3 & -3 \end{bmatrix} - 2 \begin{bmatrix} 0 & 2 \\ -2 & 3 \\ -5 & 4 \end{bmatrix} \right\} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

Find  $x$  and  $y$  if  $\left\{ 3 \begin{bmatrix} 4 & 1 & 3 \\ 0 & -1 & -3 \end{bmatrix} - 2 \begin{bmatrix} 3 & 2 & 4 \\ -6 & 1 & -3 \end{bmatrix} \right\} \begin{bmatrix} 1 \\ 3 \\ -2 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

c) IF  $A = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}$   $B = \begin{bmatrix} 3 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$  verify  $(AB)^T = B^T \cdot A^T$

d) IF  $A = \begin{bmatrix} 2 & 5 & 6 \\ 0 & 1 & 2 \end{bmatrix}$   $B = \begin{bmatrix} 6 & 1 \\ 0 & 4 \\ 5 & 7 \end{bmatrix}$  verify  $(AB)^T = B^T \cdot A^T$

e) IF  $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 0 & 2 \\ 4 & 5 & 0 \end{bmatrix}$   $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$  verify  $(AB)^T = B^T \cdot A^T$

a) Find inverse of A if  $A = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 0 & 1 \\ 1 & 2 & 1 \end{bmatrix}$ .

b) Find inverse of A if  $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$ .

c) Find inverse of A if  $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ .

d) Find inverse of A if  $A = \begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ -1 & 3 & 0 \end{bmatrix}$ .

e) Using matrix inversion method solve :  $x + 3y + 3z = 12, x + 4y + 4z = 15, x + 3y + 4z = 13$ .

f) Using matrix inversion method solve :  $2x + 3y - z = -3, 5x + y + 3z = 10, 4x + 3y - 2z - 3 = 0$ .

g) Using matrix inversion method solve :  $x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6$