

Matrices

1. Solve the equation $x + 2y = 6$ and $2x - 5y = 12$ graphically.
2. Solve the following equations for x and y using cross-multiplication method:

$$(ax - by) + (a + 4b) = 0 \quad (1)$$

$$(bx + ay) + (b - 4a) = 0 \quad (2)$$

3. If $\begin{vmatrix} 3x & 3 \\ 13 & x \end{vmatrix} = \begin{vmatrix} 4 & -2 \\ 8 & 5 \end{vmatrix}$, then the value of x is :

- (a) 3
- (b) ± 5
- (c) 25
- (d) ± 1

4. For $A = \begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix}$, if $A + A' = O$, then the value of α is:

- (a) $\frac{\pi}{6}$
- (b) $\frac{\pi}{3}$
- (c) $\frac{\pi}{2}$
- (d) π

5. For the matrix $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & -2 \\ 2 & -1 & 3 \end{pmatrix}$,

show that $A^3 - 6A^2 + 5A + 11I = 0$. Hence, find A^{-1} .

6. Using the properties of determinants, solve the following for x :

$$\begin{vmatrix} x+3 & x+7 & x-1 \\ x+7 & x-1 & x+3 \\ x-1 & x+3 & x+7 \end{vmatrix} = 0 \quad (3)$$

7. Find the value of x , if $\begin{vmatrix} 5 & 3 & -1 \\ -7 & x & 2 \\ 9 & 6 & -2 \end{vmatrix} = 0$.

8. If $A = \begin{pmatrix} 4x & 0 \\ 2x & 2x \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} 1 & 0 \\ -1 & 2 \end{pmatrix}$, then $x = \underline{\hspace{2cm}}$.

9. If $A = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$, then A^2 equals

(a) $\begin{pmatrix} 2 & -2 \\ -2 & 2 \end{pmatrix}$

(b) $\begin{pmatrix} 2 & -2 \\ -2 & -2 \end{pmatrix}$

(c) $\begin{pmatrix} -2 & -2 \\ -2 & 2 \end{pmatrix}$

(d) $\begin{pmatrix} -2 & 2 \\ 2 & -2 \end{pmatrix}$

10. The roots of the equation $\begin{vmatrix} x & 0 & 8 \\ 4 & 1 & 3 \\ 2 & 0 & x \end{vmatrix} = 0$ are

(a) $-4, 4$

(b) $2, -4$

(c) $2, 4$

(d) $2, 8$

11. A square matrix A is said to be singular if _____.

12. If $A = \begin{pmatrix} 3 & -5 \\ 2 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 17 \\ 0 & -10 \end{pmatrix}$, then $|AB| =$ _____.

13. if $\begin{pmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{pmatrix}$ is symmetric matrix, then find the value of x .

14. If A is a square matrix such that $A^2 = A$, then find $(2 + A)^3 - 19A$.

15. For the matrix $A = \begin{pmatrix} 2 & 3 \\ -4 & -6 \end{pmatrix}$, verify the following:

$$A(adj A) = (adj A)A = |A|I$$

16. Using properties of determinants show that

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2).$$

17. Find the equation of the line join $A(1, 3)$ and $B(0, 0)$, using determinants.

Also find k if $D(k, 0)$ is a point such that the area of $\triangle ABD$ is 3 square units.