

1. Find whether the following pair of linear equations are consistent or inconsistent:

$$5x - 3y = 11, -10x + 6y = 22.$$

2. Solve for  $x$  and  $y$ :

$$x + y = 6, 2x - 3y = 4.$$

3. Find out whether the pair of equations  $2x + 3y = 0$  and  $2x - 3y = 26$  is consistent or inconsistent.
4. For what values of  $k$ , does the pair of linear equations  $kx - 2y = 3$  and  $3x + y = 5$  have a unique solution?
5. What type of lines will you get by drawing the graph of the pair of equations  $x - 2y + 3 = 0$  and  $2x - 4y = 5$ ?
6. The sum of the numerator and the denominator of a fraction is 18. If the denominator is increased by 2, the fraction reduces to  $\frac{1}{3}$ . Find the fraction.
7. Find the value of  $k$  for which the system of equations  $x + 2y = 5$  and  $3x + ky + 15 = 0$  has no solution.
8. If 2 tables and 2 chairs cost ₹700 and 4 tables and 3 chairs cost ₹1,250, then find the cost of one table.
9. If the graph of a pair of lines  $x - 2y + 3 = 0$  and  $2x - 4y = 5$  be drawn, then what type of lines are drawn?
10. 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)  $\begin{pmatrix} -2 & 2 \\ 2 & -2 \end{pmatrix}$
11.  $\begin{vmatrix} 43 & 44 & 45 \\ 44 & 45 & 46 \\ 45 & 46 & 47 \end{vmatrix}$
- (a) 0
- (b) -1
- (c) 1

(d) 2

12. A square matrix  $A$  is said to be singular if \_\_\_\_\_.

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 a symmetric matrix, then find the value of  $x$ .

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

14. For matrix  $A = \begin{pmatrix} 2 & 3 \\ -4 & -6 \end{pmatrix}$ , verify the following:  $A(\text{adj}A) = (\text{adj}A)A = |A|I$

15. Using properties of determinants show that

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2)^3$$

16. Find the equation of the line joining  $A(1, 3)$  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.

17. Solve the system of linear equations, using the matrix method:

$$7x + 2y = 114x - 7 = 2$$

18. Find the Value of  $x$ , if  $(x \ 1) \begin{pmatrix} 1 & 0 \\ -2 & -1 \end{pmatrix} \begin{pmatrix} x \\ 3 \end{pmatrix} = 0$

19. If  $A = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ , then  $A^4 =$  \_\_\_\_\_.

20. Given  $A = \begin{pmatrix} 1 & -1 & 1 \\ 3 & -2 & 1 \\ -2 & 1 & 0 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 2 \\ 2 & 4 \\ 1 & -2 \end{pmatrix}$ , the order of the matrix  $AB$  is \_\_\_\_\_.

21. if  $A = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}$  ( $i^2 = -1$ ) and  $B = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ , then  $AB$  is equal to

(a)  $\begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix}$

(b)  $\begin{pmatrix} i & 0 \\ 0 & -i \end{pmatrix}$

(c)  $\begin{pmatrix} i & -i \\ 0 & 1 \end{pmatrix}$

(d)  $\begin{pmatrix} 0 & 0 \\ i & 0 \end{pmatrix}$

22. If  $A$  is a  $5 \times p$  matrix,  $B$  is a  $2 \times q$  matrix, then the order of the matrix  $AB$  is  $5 \times 4$ . What are the values of  $p$  and  $q$ ?

- (a)  $p = 2, q = 4$
- (b)  $p = 4, q = 2$
- (c)  $p = 2, q = 2$
- (d)  $p = 4, q = 4$

23. Value of  $k$ , for which  $A = \begin{pmatrix} k & 8 \\ 1 & 2k \end{pmatrix}$  is a singular matrix is:

- (a) 4
- (b) -4
- (c)  $\pm 4$
- (d) 0

24. If  $A = [a_{ij}]$  is a square matrix of order 2 such that

$$a_i = \begin{cases} 1, & i + j \\ 0, & i - j \end{cases} \quad (1)$$

, then  $A^2$  is:

- (a)  $\begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$
- (b)  $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$
- (c)  $\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$
- (d)  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

25. Given that  $A$  is a square matrix of order 3 and  $|A| = -4$ , then  $|\text{adj} A|$  is equal to:

- (a) -4
- (b) 4
- (c) -16
- (d) 16

26. If  $\begin{pmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{pmatrix} = \begin{pmatrix} 4 & -3 \\ 11 & 24 \end{pmatrix}$ , then the value of  $a + b - c + 2d$  is:

- (a) 8
- (b) 10

- (c) 4  
(d) -8
27. Given that matrices  $A$  and  $B$  are of order  $3 \times n$  and  $m \times 5$  respectively, then the order of matrix  $C = 5A + 3B$  is:
- (a)  $3 \times 5$   
(b)  $5 \times 3$   
(c)  $3 \times 3$   
(d)  $5 \times 5$
28. For matrix  $A = \begin{pmatrix} 2 & 5 \\ -11 & 7 \end{pmatrix}$ ,  $(\text{adj}A)'$  is equal to:
- (a)  $\begin{pmatrix} -2 & -5 \\ 11 & -7 \end{pmatrix}$   
(b)  $\begin{pmatrix} 7 & 5 \\ 11 & 2 \end{pmatrix}$   
(c)  $\begin{pmatrix} 7 & 11 \\ -5 & 2 \end{pmatrix}$   
(d)  $\begin{pmatrix} 7 & -5 \\ 11 & 2 \end{pmatrix}$
29. Given that  $A = [a_{ij}]$  is a square matrix of order  $3 \times 3$  and  $|A| = -7$ , then the value of  $\sum_{i=1}^3 a_{i2}A_{i2}$ , where  $A_{ij}$  denotes the cofactor of element  $a_{ij}$  is:
- (a)  $\begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$   
(b)  $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$   
(c)  $\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$   
(d)  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
30. If  $A = \begin{pmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{pmatrix}$  and  $B = \begin{pmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{pmatrix}$ , then
- (a)  $A^{-1} = B$   
(b)  $A^{-1} = 6B$   
(c)  $B^{-1} = B$   
(d)  $B^{-1} = \frac{1}{6}A$

31. Given that  $A$  is a non-singular matrix of order 3 such that  $A^2 = 2A$ , then the value of  $|2A|$  is:
- 4
  - 8
  - 64
  - 16
32. If  $A = \begin{pmatrix} 0 & 2 \\ 3 & -4 \end{pmatrix}$  and  $kA = \begin{pmatrix} 0 & 3a \\ 2b & 24 \end{pmatrix}$ , then the values of  $k, a$  and  $b$  respectively are:
- $-6, -12, -18$
  - $-6, -4, -9$
  - $-6, 4, 9$
  - $-6, 12, 18$
33. If  $A$  is square matrix such that  $A^2 = A$ , then  $(I + A)^3 - 7A$  is equal to:
- $A$
  - $I + A$
  - $I - A$
  - $I$
34. For  $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ , then  $14A^{-1}$  is given by:
- $14 \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$
  - $\begin{pmatrix} 4 & -2 \\ 2 & 6 \end{pmatrix}$
  - $2 \begin{pmatrix} 2 & -1 \\ 1 & -3 \end{pmatrix}$
  - $2 \begin{pmatrix} -3 & -1 \\ 1 & -2 \end{pmatrix}$
35. Given that  $A = \begin{pmatrix} \alpha & \beta \\ \gamma & -\alpha \end{pmatrix}$  and  $A^2 = 3I$ , then:
- $1 + \alpha^2 + \beta\gamma = 0$
  - $1 - \alpha^2 - \beta\gamma = 0$
  - $3 - \alpha^2 - \beta\gamma = 0$
  - $3 + \alpha^2 + \beta\gamma = 0$
36. Let  $A = \begin{pmatrix} 1 & \sin \alpha & 1 \\ -\sin \alpha & 1 & \sin \alpha \\ -1 & -\sin \alpha & 1 \end{pmatrix}$ , where  $0 \leq \alpha \leq 2\pi$ , then:

- (a)  $|A| = 0$
- (b)  $|A| \in (2, \infty)$
- (c)  $|A| \in (2, 4)$
- (d)  $|A| \in [2, 4]$