

Unit 5: Matrices and Determinants

1.

Find the adjoint of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$.

(a) $\begin{bmatrix} 4 & 2 \\ 3 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

Answer:
(b) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

2.

Find the adjoint of the matrix A, where $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 0 \\ 2 & 4 & 3 \end{bmatrix}$

(a) $\begin{bmatrix} 15 & 6 & 1 \\ 0 & 3 & 0 \\ 10 & 0 & 5 \end{bmatrix}$ (b) $\begin{bmatrix} 15 & 6 & -15 \\ 0 & -3 & 0 \\ -10 & 0 & 5 \end{bmatrix}$

(c) $\begin{bmatrix} 15 & -1 & 5 \\ 0 & 3 & 1 \\ 10 & 1 & 5 \end{bmatrix}$ (d) None of these

Answer:
(b) $\begin{bmatrix} 15 & 6 & -15 \\ 0 & -3 & 0 \\ -10 & 0 & 5 \end{bmatrix}$

3.

Find x, if $\begin{bmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{bmatrix}$ is singular

(a) 1
(b) 2
(c) 3
(d) 4

Answer:
(d) 4

4.

Find the value of x for which the matrix $A = \begin{bmatrix} 3-x & 2 & 2 \\ 2 & 4-x & 1 \\ -2 & -4 & -1-x \end{bmatrix}$ is singular.

(a) 0, 1
(b) 1, 3
(c) 0, 3
(d) 3, 2

Answer:
(c) 0, 3

5.

If $\begin{bmatrix} 2+x & 3 & 4 \\ 1 & -1 & 2 \\ x & 1 & -5 \end{bmatrix}$ is a singular matrix, then x is

(a) $\frac{13}{25}$

(b) $-\frac{25}{13}$

(c) $\frac{5}{13}$

(d) $\frac{25}{13}$

Answer:

(b) $-\frac{25}{13}$

6. What is the value of following determinant:

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix}$$

a) $9x^2(x+y)$

b) $9y^2(x+y)$

c) $3y^2(x+y)$

d) $7x^2(x+y)$

7. If a matrix A is both symmetric and skew symmetric then matrix A is

a) A scalar matrix

b) A diagonal matrix

c) A zero matrix of order n x n

d) A rectangular matrix

8. If A and B are symmetric matrices of the same order, then

a) AB is a symmetric matrix

b) A – B is a skew-symmetric matrix

c) AB+BA is a symmetric matrix

d) AB – BA is a symmetric matrix

9. A matrix $A = [a_{ij}]_{m \times n}$ is said to be symmetric if

a) $a_{ij} = 0$

b) $a_{ij} = a_{ji}$

c) $a_{ij} = a_{ij}$

d) $a_{ij} = 1$

10. $A = [a_{ij}]_{m \times n}$ is a square matrix if

a) $m = n$

b) $m < n$

c) $m > n$

- d) none of these
11. If A and B are square matrices then $(AB)' =$
- a) $B'A'$
 - b) $A' B'$
 - c) $A B'$
 - d) $A' B$
12. If A and B matrices are of same order and $A + B = B + A$, this law is known as
- a) Distributive law
 - b) Commutative law
 - c) Associative law
 - d) Cramer's law
13. If a matrix has equal number of columns and rows then it is said to be a
- a) Row matrix
 - b) Identical matrix
 - c) Square matrix
 - d) Rectangular matrix
14. If determinant of a matrix is equal to zero, then it is said to be
- a) Square matrix
 - b) Singular matrix
 - c) Non-singular matrix
 - d) Identical matrix
15. If the number of columns and rows are not equal in a matrix, then it is said to be a
- a) Rectangular matrix
 - b) Square matrix
 - c) Diagonal matrix
 - d) Null matrix
16. The law which does not hold in multiplication of matrices is known as
- a) Distributive law
 - b) Inverse law
 - c) Associative law
 - d) Commutative law
17. In matrices $(AB)^T$ equal to
- a) B
 - b) A
 - c) $A^T B^T$

- d) $B^T A^T$
18. If determinant of a matrix is not equal to zero, then it is said to be
- a) Non-singular matrix
 - b) Square matrix
 - c) Singular matrix
 - d) Identical matrix
19. A diagonal matrix having equal elements is called a
- a) Square matrix
 - b) identical matrix
 - c) scalar matrix
 - d) rectangular matrix
20. If A, B and C matrices are of same order and $(A + B) + C = A + (B + C)$, this law is known as
- a) Cramer's law
 - b) Distributive law
 - c) Commutative law
 - d) Associative law
21. Generally the matrices are denoted by
- a) Capital letters
 - b) Numbers
 - c) Small letters
 - d) Operational signs
22. A matrix with only 1 column is called
- a) Column matrix
 - b) Row matrix
 - c) Identical matrix
 - d) Square matrix
23. We can subtract two matrices A and B if their
- a) Elements are same
 - b) Order is same
 - c) Rows are same
 - d) Columns are same
24. Vertically arranged elements in a matrix are called
- a) Columns
 - b) Rows
 - c) Determinants
 - d) Transpose

25. A scalar matrix having each element equal to 1 is said to be
- a) Unit or identical matrix
 - b) Rectangular matrix
 - c) Square matrix
 - d) Diagonal matrix
26. If all elements in a matrix are zeros, then it is called a
- a) Column matrix
 - b) diagonal matrix
 - c) identical matrix
 - d) null/zero matrix
27. A matrix with only 1 row is called
- a) Column matrix
 - b) Row matrix
 - c) Identical matrix
 - d) Square matrix
28. If two matrices A and B have same order and their corresponding elements are equal then it is called
- a) Matrix equality
 - b) Rectangular matrix
 - c) Square matrix
 - d) Identical matrix
29. If a matrix 'A' has 'm' number of rows and 'n' number of columns then $m \times n$ is said to be
- a) Transpose of a matrix
 - b) Order of a matrix
 - c) Determinant of a matrix
 - d) Equality of a matrix
30. If the order of matrix A is $m \times p$ and the order of B is $p \times n$. Then the order of matrix AB is?
- a) $n \times p$
 - b) $m \times n$
 - c) $n \times p$
 - d) $n \times m$
31. Transpose of a rectangular matrix is a
- a) Scalar matrix
 - b) Square matrix
 - c) Diagonal matrix

d) Rectangular matrix

32. Transpose of a column matrix is

a) Row matrix

b) Column matrix

c) Zero matrix

d) diagonal matrix

33. two matrices A and B are multiplied to get AB if

a) both are rectangular

b) both have same order

c) number of columns of A is equal to rows of B

d) number of rows of A is equal to columns of B

34. If A is symmetric matrix, then $A^T =$

a) 0

b) A

c) $\text{Det}(A)$

d) Diagonal matrix

35. Matrices obtained by changing rows and columns is called

a) Symmetric matrix

b) Transpose matrix

c) Rectangular matrix

d) None of above

36. $\begin{bmatrix} 0 & 0 & 0 \end{bmatrix}$ is

a) Null matrix

b) Scalar matrix

c) Identity matrix

d) Diagonal matrix

37. Order of a matrix $\begin{bmatrix} 2 & 5 & 7 \end{bmatrix}$ is

a) 1 x 1

b) 1 x 3

c) 3 x 1

d) 3 x 3

38.

$$\text{If } \begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix} \text{ then value of x is}$$

(a) 3 (b) ± 6 (c) 8 (d) -2

39.

3. What is 'a', if

$$B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$$

is a singular matrix ?

- (A) 5
(B) 6
(C) 7
(D) 8

The value of determinant $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$

1. 0

2. 1

3. $a+b+c$

4. 3

Answer (Detailed Solution Below)

Option 1 : 0

40.