

50+ Matrices and Determinants Qns for NDA Exam

1. Consider the following in respect of the matrices:

$$A = [m \ n], B = [-n \ -m] \text{ and } C = \begin{bmatrix} m \\ -m \end{bmatrix}$$

- 1). $CA = CB$
- 2). $AC = BC$
- 3). $C(A + B) = CA + CB$

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. 2 and 3
- D. 1 and 2

2. If $A = \begin{bmatrix} 2 \sin \theta & \cos \theta & 0 \\ -2 \cos \theta & \sin \theta & 0 \\ -1 & 1 & 1 \end{bmatrix}$, then what is $A(\text{adj } A)$ equal to?

- A. Null matrix
- B. $-I$
- C. I
- D. $2I$

3. For what value of k is the matrix $\begin{bmatrix} 2 \cos 2\theta & 2 \cos 2\theta & 6 \\ 1 - 2 \sin^2 \theta & 2 \cos^2 \theta - 1 & 3 \\ k & 2k & 1 \end{bmatrix}$ singular?

- A. 0 only
- B. 1 only
- C. 2 only
- D. Any real value

4. Let A be a non-singular matrix and $B = \text{adj } A$. Which of the following statements is/are correct?

- 1). $AB = BA$

- 2). AB is a scalar matrix
- 3). AB can be a null matrix

Select the correct answer using the code given below:

- A. 1 only
- B. 1 and 2 only
- C. 2 only
- D. 1, 2 and 3

5. Consider the following statements in respect of square matrices A and B of same order:

- 1). If AB is a null matrix, then at least one of A and B is a null matrix.
- 2). If AB is an identity matrix, then $BA = AB$.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

6. Let A and B be non-singular matrices of the same order such that $AB = A$ and $BA = B$. Which of the following statements is/are correct?

- 1). $A^2 = A$
- 2). $AB^2 = A^2B$

Select the correct answer using the code given below:

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

7. If A is a square matrix of order 3 with $|A| \neq 0$, then which one of the following is correct?

- A. $|\text{adj } A| = |A|$
- B. $|\text{adj } A| = |A|^2$
- C. $|\text{adj } A| = |A|^3$

D. $|\text{adj } A|^2 = |A|$

8. If $A = \begin{pmatrix} 1 & 0 \\ 0 & -i \end{pmatrix}$, $B = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$, $C = \begin{pmatrix} 0 & i \\ 0 & 0 \end{pmatrix}$ Where $i = \sqrt{-1}$, then which one of the following is correct?

- A. $AB = -C$
- B. $AB = C$
- C. $A^2 = B^2 = C^2 = I$, where I is the identity matrix
- D. $BA^{-1} = C$

9. If $2A = \begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$, then what is A^{-1} equal to?

- A. $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$
- B. $\frac{1}{2} \begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$
- C. $\frac{1}{4} \begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$
- D. None of the above

10. If $\begin{pmatrix} 2 & 3 \\ 4 & 1 \end{pmatrix} \begin{pmatrix} 5 & -2 \\ -3 & 1 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ 17 & \lambda \end{pmatrix}$ then what is λ equal to?

- A. 7
- B. -7
- C. 9
- D. -9

11. Consider the following statements:

- 1) Every zero matrix is a square matrix.
- 2) A matrix has a numerical value.
- 3) A unit matrix is a diagonal matrix.

Which of the above statements is/are correct?

- A. 2 Only
- B. 3 Only
- C. 2 and 3
- D. 1 and 3

12. If the sum of the matrices $\begin{bmatrix} x \\ x \\ y \end{bmatrix}$, $\begin{bmatrix} y \\ y \\ z \end{bmatrix}$ and $\begin{bmatrix} z \\ 0 \\ 0 \end{bmatrix}$ is the matrix $\begin{bmatrix} 10 \\ 5 \\ 5 \end{bmatrix}$, then what is the value of y ?

- A. -5
- B. 0
- C. 5
- D. 10

13. If the matrix AB is a zero matrix, then which one of the following is correct?

- A. A must be equal to zero matrix or B must be equal to zero matrix
- B. A must be equal to zero matrix and B must be equal to zero matrix
- C. It is not necessary that either A is zero matrix or B is zero matrix
- D. None of the above

14. The inverse of a diagonal matrix is a :

- A. symmetric matrix
- B. skew-symmetric matrix
- C. diagonal matrix
- D. None of the above

15. If a matrix A has inverses B and C , then which one of the following is correct?

- A. B may not be equal to C
- B. B should be equal to C .
- C. B and C should be unit matrices
- D. None of the above

16. Consider the following statements :

- 1) Every zero matrix is a square matrix.
- 2) A matrix has a numerical value.

3) A unit matrix is a diagonal matrix.

Which of the above statements is/are correct?

- A. 2 only
- B. 3 only
- C. 2 and 3
- D. 1 and 3

17. A square matrix $[a_{ij}]$ such that $a_{ij} = 0$ for $i \neq j$ and $a_{ij} = k$ where k is a constant for $i = j$ is called :

- A. diagonal matrix, but not scalar matrix
- B. scalar matrix
- C. unit matrix
- D. None of the above

18. If A and B are two non-singular square matrices such that $AB = A$, then which one of the following is correct?

- A. B is an identity matrix
- B. $B = A^{-1}$
- C. $B = A^2$
- D. Determinant of B is zero.

19. Consider the following statements :

1. A matrix is not a number.
2. Two determinants of different orders may have the same value.

Which of the above statements is/are correct ?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

20. If $A = \begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}$ where $a \in \mathbb{N}$, then what is $A^{100} - A^{50} - 2A^{25}$ Equal to?

(If I is the identity matrix)

- A. $-2I$
- B. $-I$
- C. $2I$
- D. I

21. If A is a matrix of order 3×5 and B is a matrix of order 5×3 , then the order of AB and BA will respectively be

- A. 3×3 and 3×3
- B. 3×5 and 5×3
- C. 3×3 and 5×5
- D. 5×3 and 3×5

22. If $A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -1 \\ 1 & 2 \end{bmatrix}$, then what is $B^{-1} A^{-1}$ equal to?

- A. $\begin{bmatrix} 1 & -3 \\ -1 & 2 \end{bmatrix}$
- B. $\begin{bmatrix} -1 & 3 \\ 1 & -2 \end{bmatrix}$
- C. $\begin{bmatrix} -1 & 3 \\ -1 & -2 \end{bmatrix}$
- D. $\begin{bmatrix} -1 & -3 \\ 1 & -2 \end{bmatrix}$

23. The cofactor of the element 4 in the determinant $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 5 & 8 & 9 \end{vmatrix}$ is

- A. 2
- B. 4
- C. 6
- D. -6

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

24. Consider the following in respect of the matrix

- 1) Inverse of A does not exist
- 2) $A^3 = A$
- 3) $3A = A^2$

Which of the above are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

25. Let $A = \begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix}$ and $(mI + nA)^2 = A$. Where, m, n are positive real numbers, and I is the identity matrix. What is (m + n) equal to?

- A. 0
- B. 1/2
- C. 1
- D. 3/2

26. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and $kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a, b are respectively.

- A. -6, -12, -18
- B. -6, 4, 9
- C. -6, -4, -9
- D. -6, 12, 18

27. If $AB = A$ and $BA = B$, where A and B are square matrices, then

- A. $B^2 = B$ and $A^2 = A$
- B. $B^2 \neq B$ and $A^2 = A$
- C. $A^2 \neq A$, $B^2 = B$
- D. $A^2 \neq A$, $B^2 \neq B$

28. A square non-singular matrix A satisfies $A^2 - A + 2I = 0$, then $A^{-1} =$

- A. $I - A$
- B. $\frac{1}{2}(I - A)$
- C. $I + A$
- D. $\frac{1}{2}(I + A)$

29. If $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \lambda \end{bmatrix}$ is a singular matrix then λ equal to:

- A. 3
- B. 4
- C. 2
- D. 5

30. If $3A + 4B^T = \begin{bmatrix} 3 & -5 & 7 \\ 2 & 4 & 5 \end{bmatrix}$ and $2B - 3A^T = \begin{bmatrix} -1 & -5 \\ 2 & 6 \\ -4 & 4 \end{bmatrix}$ then B =

- A. $\begin{bmatrix} 1 & -1 \\ -1 & 5 \\ 1 & 3 \end{bmatrix}$
- B. $\begin{bmatrix} \frac{1}{2} & -\frac{1}{4} \\ \frac{1}{2} & -\frac{5}{3} \\ \frac{1}{2} & \frac{5}{2} \end{bmatrix}$
- C. $\begin{bmatrix} \frac{1}{3} & -\frac{1}{2} \\ -\frac{1}{2} & \frac{5}{3} \\ \frac{1}{2} & \frac{3}{2} \end{bmatrix}$

D. None of the above

31. $A = \begin{bmatrix} x+y & y \\ x & x-y \end{bmatrix}$, $B = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$ $C = \begin{bmatrix} 4 \\ -2 \end{bmatrix}$. If $AB = C$, then what is A^2 equal to?

A. $\begin{bmatrix} 4 & 8 \\ -4 & 16 \end{bmatrix}$

B. $\begin{bmatrix} 4 & -4 \\ 8 & -16 \end{bmatrix}$

C. $\begin{bmatrix} -4 & -8 \\ 4 & 12 \end{bmatrix}$

D. $\begin{bmatrix} -4 & -8 \\ 8 & 12 \end{bmatrix}$

32. The matrix A has x rows and $x + 5$ columns. The matrix B has y rows and $11 - y$ columns. Both AB and BA exist. What are the values of x and y respectively?

- A. 8 and 3
- B. 3 and 4
- C. 3 and 8
- D. 8 and 8

33. Two straight line paths are represented by the equations $2x - y = 2$ and $-4x + 2y = 6$. Then the paths will

- A. cross each other at one point
- B. not cross each other
- C. cross each other at two points
- D. cross each other at infinitely many points

34. If the numbers $n - 3$, $4n - 2$, $5n + 1$ are in AP, what is the value of n ?

- A. 1
- B. 2
- C. 3
- D. 4

35. Consider the function $f(x) = \begin{cases} x^2, & x > 2 \\ 3x - 2, & x \leq 2 \end{cases}$ which one of the following statements is correct of the above function?

- A. $f(x)$ is derivable but not continuous at $x = 2$
- B. $f(x)$ is continuous but not derivable at $x = 2$
- C. $f(x)$ is neither continuous nor derivable at $x = 2$
- D. $f(x)$ is continuous as well as derivable at $x = 2$

36. If $x = \frac{a}{b-c}, y = \frac{b}{c-a}, z = \frac{c}{a-b}$. Then what is the value of the following?

$$\begin{vmatrix} 1 & -x & x \\ 1 & 1 & -y \\ 1 & z & 1 \end{vmatrix}$$

- A. 0
- B. 1
- C. abc
- D. $ab + bc + ca$

37. If $A = \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$, then $|ABB^t| = ?$

- A. 250
- B. -250
- C. 400
- D. 300

38. If $A = \begin{pmatrix} 1 & 2 \\ 2 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$ then what is determinant of AB ?

- A. 0
- B. 1
- C. 10
- D. 20

39. If each element in a row of a determinant is multiplied by the same factor r , then the value of the determinant :

- A. is multiplied by r^3
- B. is increased by $3r$
- C. remains unchanged
- D. is multiplied by r

40. If $A = \begin{bmatrix} 3 & 4 \\ 5 & 6 \\ 7 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 & 7 \\ 4 & 6 & 8 \end{bmatrix}$, then which one of the following is correct?

- A. B is the inverse of A
- B. B is the adjoint of A
- C. B is the transpose of A
- D. None of the above

41. The value of the determinant

$$\begin{vmatrix} x^2 & 1 & y^2+z^2 \\ y^2 & 1 & z^2+x^2 \\ z^2 & 1 & x^2+y^2 \end{vmatrix}$$
 is:

- A. 0
- B. $x^2 + y^2 + z^2$
- C. $x^2 + y^2 + z^2 + 1$
- D. None of the above

42. If $\Delta = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}$ then what is $\begin{vmatrix} 3d+5g & 4a+7g & 6g \\ 3e+5h & 4b+7h & 6h \\ 3f+5i & 4c+7i & 6i \end{vmatrix}$ equal to ?

- A. Δ
- B. 7Δ
- C. 72Δ
- D. -72Δ

43. If $\begin{vmatrix} a & -b & a-b-c \\ -a & b & -a+b-c \\ -a & -b & -a-b+c \end{vmatrix} - kabc = 0$

$$(a \neq 0, b \neq 0, c \neq 0)$$

Then what is the value of k?

- A. -4
- B. -2
- C. 2
- D. 4

44. Let $a - 2b + c = 1$

If $f(x) = \begin{vmatrix} x+a & x+2 & x+1 \\ x+b & x+3 & x+2 \\ x+c & x+4 & x+3 \end{vmatrix}$, then

- A. $f(-50) = 501$
- B. $f(-50) = -1$
- C. $f(50) = -501$
- D. $f(50) = 1$

45. If x, y, z are distinct real number and $\begin{vmatrix} x & x^2 & 2+x^3 \\ y & y^2 & 2+y^3 \\ z & z^2 & 2+z^3 \end{vmatrix} = 0$, then $xyz =$

- A. 1
- B. -1
- C. 2
- D. -2

46. The factorised form of the following determinant is $\begin{vmatrix} 1 & l & l^2 \\ 1 & m & m^2 \\ 1 & n & n^2 \end{vmatrix} ?$

- A. $(m-1)(n-1)(n-1)$
- B. $(l-m)(n-l)(n-m)$
- C. $(m-l)(n-l)(n-m)$
- D. $(m-n)(n-1)(n)$

47. If $\Delta = \begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ 2x-3 & 3x-4 & 4x-5 \\ 3x-5 & 5x-8 & 10x-17 \end{vmatrix} = Ax^3 + Bx^2 + Cx + D$, then $B+C$ is equal to:

- A. -1
- B. 1
- C. -3

D. 9

48. What is the value of determinant $\begin{vmatrix} x+2 & x+3 & x+5 \\ x+4 & x+6 & x+9 \\ x+8 & x+11 & x+15 \end{vmatrix}$

- A. 2
- B. $x+2$
- C. -2
- D. $x-2$

49. If $\omega = \frac{-1 + i\sqrt{3}}{2}$, then find the value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & -1 - \omega^2 & \omega^2 \\ 1 & \omega^2 & \omega^4 \end{vmatrix}$.

- A. $3(2\omega^2 + 1)$
- B. $3(2\omega^2 - 1)$
- C. $3(1 - 2\omega^2)$
- D. $-3(1 + 2\omega^2)$

50. Under which condition, are the points (a, b) , (c, d) and $(a - c, b - d)$ collinear?

- A. $ab = cd$
- B. $ac = bd$
- C. $ad = bc$
- D. $abc = d$

51. If $\begin{vmatrix} -2a & a+b & a+c \\ b+a & -2b & b+c \\ a+c & b+c & -2c \end{vmatrix} = a(a+b)(b+c)(c+a) \neq 0$ then a is equal to:

- A. 2
- B. 4
- C. 6
- D. 8