JNANAPEETA DCET ACADEMY

1. MATRICES AND DETERMINANTS (IT SKILLS)

1. What is a matrix?

a) A set of numbers arranged in a rectangular form

b) A set of numbers arranged in a circular form

c) A set of numbers arranged in a triangular form

d) A set of numbers arranged in a square form

Answer: a) A set of numbers arranged in a rectangular form

2. Which of the following is a row matrix?

a) [1, 2, 3]

b) [[1], [2], [3]]

c) [[1, 2, 3]]

d) [[1, 2, 3], [4, 5, 6]]

Answer: c) [[1, 2, 3]]

3. Which of the following is a column matrix?

a) [1, 2, 3]

b) [[1], [2], [3]]

c) [[1, 2, 3]]

d) [[1, 2, 3], [4, 5, 6]]

Answer: b) [[1], [2], [3]]

4. What is the order of a matrix?

a) The number of rows in a matrix

b) The number of columns in a matrix

c) The number of elements in a matrix

d) The number of dimensions in a matrix

Answer: a) The number of rows in a matrix

5. What is the order of the matrix [[1, 2], [3, 4], [5, 6]]?

a) 2x2

b) 2x3

c) 3x2

d) 3x3

Answer: c) 3x2

6. What is the sum of the matrices [[1, 2], [3, 4]] and [[-1, -2], [-3, -4]]?

a) [[0, 0], [0, 0]]

b) [[2, 4], [6, 8]]

c) [[1, 2], [3, 4]]

d) [[-2, -4], [-6, -8]]

Answer: a) [[0, 0], [0, 0]]

7. What is the product of the matrices [[1, 2], [3, 4]] and [[-1, -2], [-3, -4]]?

a) [[-7, -10], [-15, -22]]

b) [[-1, -4], [-3, -8]]

c) [[5, 10], [15, 20]]

d) [[1, 4], [3, 8]]

Answer: a) [[-7, -10], [-15, -22]]

8. What is the determinant of the matrix [[2, 3], [4, 5]]?

a) -2

b) -1

c) 2

d) 1

Answer: d) 1

9. What is the determinant of the matrix [[3, 2], [6, 4]]?

a) 2

b) 4

c) 6

d) 0

Answer: d) 0

10. What is the determinant of the matrix [[1, 2, 3], [4, 5, 6], [7, 8, 9]]?

a) 6

b) 12

c) 18

d) 0

Answer: d) 0

11. What is a singular matrix?

a) A matrix with only one row

b) A matrix with only one column

c) A matrix with zero determinant

d) A matrix with non-zero determinant

Answer: c) A matrix with zero determinant

12. What is the inverse of a matrix?

a) A matrix obtained by swapping the rows and columns

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b) A matrix obtained by dividing each element by its determinant

c) A matrix obtained by adding the transpose to the original matrix

d) A matrix obtained by multiplying each element by its determinant

Answer: b) A matrix obtained by dividing each element by its determinant

13. What is the inverse of the matrix [[2, 1], [4, 3]]?

a) [[1, 2], [3, 4]]

b) [[-2, 1], [1.5, -0.5]]

c) [[-3, 4], [2, -1]]

d) [[4, -1], [-3, 2]]

Answer: b) [[-2, 1], [1.5, -0.5]]

14. What is Cramer's rule used for?

a) Solving systems of linear equations

b) Simplifying complex matrices

c) Finding the determinant of a matrix

d) Multiplying two matrices

Answer: a) Solving systems of linear equations

15. Cramer's rule is used to solve systems of linear equations with how many variables?

a) 1

b) 2

c) 3

d) Any number

Answer: d) Any number

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16. What is the characteristic equation of a square matrix?

a) A polynomial equation that describes the matrix

b) An equation that represents the eigenvalues of the matrix

c) A linear equation that represents the determinant of the matrix

d) An equation that describes the rank of the matrix

Answer: b) An equation that represents the eigenvalues of the matrix

17. What are eigenvalues?

a) The determinant of a matrix

b) The roots of the characteristic equation

c) The diagonal elements of a matrix

d) The inverse of a matrix

Answer: b) The roots of the characteristic equation

18. What is the characteristic equation of a 2x2 matrix?

a) ax^2 + bx + c = 0

b) x^2 + px + q = 0

c) x^2 + ax + b = 0

d) x^2 + bx + a = 0

Answer: c) x^2 + ax + b = 0

19. What is the characteristic equation of the matrix [[2, 3], [4, 5]]?

a) x^2 - 7x + 10 = 0

b) x^2 - 3x + 2 = 0

c) x^2 + 7x +10 = 0

d) x^2 - 5x + 6 = 0

Answer: b) x^2 - 3x + 2 = 0

20. What is the eigen value of a 2x2 matrix with characteristic equation x^2 - 3x + 2 = 0?

a) 1

b) 2

c) 3

d) 4

Answer: a) 1

21. What is the characteristic equation of a square matrix of order 2?

a) x^2 - ax - b = 0

b) x^2 + ax + b = 0

c) x^2 - bx + a = 0

d) x^2 + bx + a = 0

Answer: d) x^2 + bx + a = 0

22. What are the eigenvalues of a matrix?

a) The solutions to the characteristic equation

b) The elements on the main diagonal of the matrix

c) The inverse of the matrix

d) The determinant of the matrix

Answer: a) The solutions to the characteristic equation

23. What is the characteristic equation for a matrix A?

a) det(A) = 0

b) tr(A) = 0

c) det(A) - λI = 0

d) tr(A) - λI = 0

Answer: c) det(A) - λI = 0

24. What is the eigenvalue of a matrix A that satisfies the characteristic equation λ^2 - 4λ + 3 = 0?

a) 1, 3

b) 2, 2

c) 1, 2

d) 3, 3

Answer: a) 1, 3

25. How many eigenvalues does a square matrix of order 2 have?

a) 0

b) 1

c) 2

d) 3

Answer: c) 2

26. What is the determinant of a matrix A if one of its eigenvalues is zero?

a) 0

b) 1

c) -1

d) Depends on other eigenvalues

Answer: a) 0

27. What is the determinant of a matrix A if all of its eigenvalues are non-zero?

a) 0

b) 1

c) -1

d) Cannot be determined from the given information

Answer: d) Cannot be determined from the given information

28. What is Cramer's rule used for?

a) Finding the determinant of a matrix

b) Solving systems of linear equations

c) Calculating eigenvalues of a matrix

d) Inverting a matrix

Answer: b) Solving systems of linear equations

29. Cramer's rule is used to solve systems of linear equations with how many variables?

a) 1

b) 2

c) 3

d) Any number

Answer: d) Any number

30. What is the formula for the solution of a system of linear equations using Cramer's rule?

a) x = A^(-1) * b

b) x = A * b

c) x = b * A

d) x = det(A) / det(b)

Answer: a) x = A^(-1) * b

31. Cramer's rule is applicable when the determinant of the coefficient matrix is:

a) 0

b) 1

c) Non-zero

d) Negative

Answer: c) Non-zero

32. What is the solution of the system of linear equations using Cramer's rule if the determinant of the coefficient matrix is 0?

a) No solution

b) Infinite solutions

c) Unique solution

d) Cannot be determined

Answer: a) No solution

33. How many determinants are calculated in Cramer's rule for a system of linear equations with three variables?

a) 1

b) 2

c) 3

d) 4

Answer: c) 3

34. In Cramer's rule, what does each determinant represent?

a) The coefficients of the variables

b) The values of the variables

c) The solutions of the equations

d) The scaling factor for each variable

Answer: b) The values of the variables

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35. What is the formula for the solution of a system of linear equations with two variables using Cramer's rule?

a) x = (Dx / D), y = (Dy / D)

b) x = (Dx / D), y = (Dy / Dx)

c) x = (D / Dx), y = (D / Dy)

d) x = (D / Dx), y = (D / D)

Answer: a) x = (Dx / D), y = (Dy / D)

36. What is the formula for the solution of a system of linear equations with three variables using Cramer's rule?

a) x = (Dx / D), y = (Dy / D), z = (Dz / D)

b) x = (Dx / D), y = (Dy / Dx), z = (Dz / Dx)

c) x = (D / Dx), y = (D / Dy), z = (D / Dz)

d) x = (D / Dx), y = (D / D), z = (D / Dz)

Answer: a) x = (Dx / D), y = (Dy / D), z = (Dz / D)

37. What is the adjoint of a matrix?

a) The transpose of the matrix

b) The conjugate of the matrix

c) The inverse of the matrix

d) The determinant of the matrix

Answer: a) The transpose of the matrix

38. What is the inverse of a matrix?

a) The adjoint of the matrix

b) The determinant of the matrix

c) The reciprocal of the matrix

d) The product of the matrix and its adjoint

Answer: d) The product of the matrix and its adjoint

39. What is the inverse of a non-singular matrix?

a) Singular matrix

b) Identity matrix

c) Zero matrix

d) Unit matrix

Answer: b) Identity matrix

40. What is the eigenvalue of a matrix if its determinant is zero? a) Zero

b) Non-zero

c) Cannot be determined

d) Infinite

Answer: a) Zero

41. Which operation is performed between two matrices to obtain their sum?

a) Multiplication

b) Division

c) Addition

d) Subtraction

Answer: c) Addition

42. Which of the following matrices can be added together?

a) Matrices of different dimensions

b) Matrices of the same dimensions

c) Matrices with different element types

d) Matrices with different determinants

Answer: b) Matrices of the same dimensions

43. What is the result of the following matrix addition?

A = [[1, 2], [3, 4]]

B = [[-1, -2], [-3, -4]]

A + B = ?

a) [[0, 0], [0, 0]]

b) [[0, 0], [0, 1]]

c) [[2, 4], [6, 8]]

d) [[-2, -4], [-6, -8]]

Answer: a) [[0, 0], [0, 0]]

44. Which operation is performed between two matrices to obtain their difference?

a) Multiplication

b) Division

c) Addition

d) Subtraction

Answer: d) Subtraction

45. What is the result of the following matrix subtraction?

A = [[1, 2], [3, 4]]

B = [[-1, -2], [-3, -4]]

A - B = ?

a) [[2, 4], [6, 8]]

b) [[0, 0], [0, 1]]

c) [[0, 0], [0, 0]]

d) [[-2, -4], [-6, -8]]

Answer: c) [[0, 0], [0, 0]]

46. Which operation is performed between a matrix and a scalar value to obtain the scaled matrix?

a) Addition

b) Subtraction

c) Multiplication

d) Division

Answer: c) Multiplication

47. What is the result of the following scalar multiplication?

A = [[1, 2], [3, 4]]

k = 2

k * A = ?

a) [[2, 4], [6, 8]]

b) [[0, 0], [0, 2]]

c) [[1, 2], [3, 4]]

d) [[-1, -2], [-3, -4]]

Answer: a) [[2, 4], [6, 8]]

48. Which operation is performed between two matrices to obtain their matrix product?

a) Addition

b) Subtraction

c) Multiplication

d) Division

Answer: c) Multiplication

49. What is the result of the following matrix multiplication?

A = [[1, 2], [3, 4]]

B = [[-1, -2], [-3, -4]]

A * B = ?

a) [[-5, -8], [-11, -18]]

b) [[-1, -4], [-3, -8]]

c) [[0, 0], [0, 0]]

d) [[2, 4], [6, 8]]

Answer: a) [[-5, -8], [-11, -18]]

50. In matrix multiplication, the number of columns in the first matrix must be equal to the number of _____ in the second matrix.

a) Rows

b) Columns

c) Elements

d) Determinants

Answer: a) Rows