Practical No-2: System of Linear Equations and Matrices

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45. Eigenvector(s) of the matrix $\begin{bmatrix} 0 & 0 & a \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is (are):

a) (0, 0, a)
b) (0, a, 0)
c) (0, 0, 1)
d) None of the above

Answer: (b)

46. Determinant of the matrix $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 100 & 1 & 0 & 0 \\ 100 & 200 & 1 & 0 \\ 100 & 200 & 300 & 1 \end{bmatrix}$ is:

a) 1
b) 100
c) 200
d) None of the above

Answer: (a)

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47. The rank of a null matrix is:

- **a)** 1
- **b)** 2
- **c)** 4
- **d)** None of the above

Answer: (d)

48. The system of equations $4x + 6y = 5, 8x + 12y = 10$ has:

- **a)** No solution.
- **b)** Infinitely many solutions.
- **c)** A unique solution.
- **d)** None of the above

Answer: (b)

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49. The system of equations $2x + 3y = 5, 6x + 9y = a$ has infinitely many solution if a is:

- **a)** 10.
- **b)** 2.
- **c)** 15.
- **d)** None of the above

Answer: (c)

50. According to determinant properties, determinant equals to zero if column is:

- **a)** Divided to row.
- **b)** Divided to column.
- **c)** Multiplied to row.
- **d)** Multiplied to column.

Answer: (d)

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51. Rule which provides method of solving determinants is classified as:

- **a)** Cramer's rule.
- **b)** Determinant rule.
- **c)** Solving rule.
- **d)** None of the above.

Answer: (a)

52. Value of determinant is computed by adding multiples of one row to:

- **a)** Another dimension.
- **b)** Another row.
- **c)** Another column.
- **d)** None of the above.

Answer: (b)

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53. Method in which rows and columns are cross off and minor determinants are involved if classified as:

- **a)** Method of three factors.
- **b)** Method of one factor.
- **c)** Gauss-Jordan elimination.
- **d)** None of the above.

Answer: (d)

54. What is a, if $B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$ is a singular matrix?

- **a)** 5.
- **b)** 8.
- **c)** 6.
- **d)** None of the above.

Answer: (b)

55. Eigen values of a square symmetric matrix are always:

- **a)** Positive.
- **b)** Real and imaginary.
- **c)** Negative.
- **d)** Real.

Answer: (d)

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56. Two equivalent vectors must have the same initial point:

- **a)** False.
- **b)** True.
- **c)** May be.
- **d)** None of the above.

Answer: (a)

57. If $\mathbf{u} + \mathbf{v} = \mathbf{u} + \mathbf{w}$, then:

- **a)** $\mathbf{v} + \mathbf{w}$.
- **b)** $\mathbf{v} \neq \mathbf{w}$.
- **c)** $\mathbf{v} = \mathbf{w}$.
- **d)** None of the above.

Answer: (c)

58. If $(a,b,c) + (x,y,z) = (x,y,z)$, then (a,b,c) must be the zero vector:

- **a)** False.
- **b)** True.
- **c)** May be.
- **d)** None of the above.

Answer: (b)

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59. If the vectors **v** and **w** are given, then the vector equation $3(2\boldsymbol{v}-\boldsymbol{x})=5\boldsymbol{x}-4\boldsymbol{w}+\boldsymbol{v}$, can be solved for **x**:

a) True.
b) False.
c) May be.
d) None of the above.

Answer: (a)

60. Which of the following set of vectors is linearly independent?

a) $\begin{bmatrix}2\\0\\0\end{bmatrix}\begin{bmatrix}2\\2\\2\end{bmatrix}\begin{bmatrix}2\\0\\0\end{bmatrix}$

b) $\begin{bmatrix}0\\1\\-1\end{bmatrix}\begin{bmatrix}2\\-1\\1\end{bmatrix}\begin{bmatrix}2\\0\\0\end{bmatrix}$

c) $\begin{bmatrix}2\\1\\1\end{bmatrix}\begin{bmatrix}2\\2\\2\end{bmatrix}\begin{bmatrix}2\\0\\0\end{bmatrix}$

d) $\begin{bmatrix}2\\0\\0\end{bmatrix}\begin{bmatrix}2\\2\\2\end{bmatrix}\begin{bmatrix}1\\-1\\1\end{bmatrix}$

Answer: (d)

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67. Which one of the following is an elementary matrix?

a) $\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & -3 & -3 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 \\ 0 & -3 \end{bmatrix}$

d) None of the above.

Answer: (c)

68. Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and let k be a scalar A. formula that relates det kA to and det A is:

a) $\det kA = k \det A$

b) $\det kA = \det(k + A)$

c) $\det A = k.\det A$

d) $\det KA = K^2 \det A.$

Answer: (d)

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75. A system of linear equations is said to be homogeneous if it can be written in the form:

a) $AX = B$
b) $AB = X$
c) $X = A^{-1}$
d) $AX = 0$

Answer: (d)

76. Which of the following is not a linear equation?

a) $x_1 + 4x_2 + 1 = x_3$
b) $x_1 + 4x_1x_2 - \sqrt{2}x_3 = \sqrt{4}$
c) $x_1 = 1$
d) None of the above.

Answer: (b)

77. If A is a 2 x 2 matrix, the area of the parallelogram determined by the columns of A is:

a) det A.
b) adj A.
c) Both (a) and (b).
d) None of the above.

Answer: (a)

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78. Cramer's rule leads easily to a general formula for:

- **a)** The adjugate of a matrix A.
- **b)** The determinant of a matrix A.
- **c)** The inverse of n x n matrix A.
- **d)** None of the above.

Answer: (c)

79. The transpose of a lower triangular matrix is:

- **a)** Lower triangular matrix.
- **b)** Upper triangular matrix.
- **c)** Diagonal matrix.
- **d)** None of the above.

Answer: (b)

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84. Given the system $\begin{cases} x_1 - 2x_2 + x_3 = 8 \\ 2x_2 - 7x_3 = 0 \\ -4x_1 + 3x_2 + 9x_3 = -6 \end{cases}$ the augmented matrix for the system is:

a) $\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -7 \\ -4 & 3 & 9 \end{bmatrix}$

b) $\begin{bmatrix} 1 & -2 & 1 & 1 \\ 0 & 2 & 9 & -7 \\ -4 & 3 & 7 & 9 \end{bmatrix}$

c) $\begin{bmatrix} 1 & -2 & 1 & 1 \\ 0 & 2 & -7 & 0 \\ -4 & 3 & 9 & -6 \end{bmatrix}$

d) $\begin{bmatrix} 1 & -2 & 1 & 8 \\ 0 & 2 & -7 & 0 \\ -4 & 3 & 9 & -6 \end{bmatrix}$

Answer: (d)

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85. Given the augmented matrix $\begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & -7 \\ -4 & 3 & 9 \end{bmatrix}$ the system of linear equations corresponding to the matrix is:

a) $\begin{cases} x_1 + 2x_2 + x_3 = 0 \\ 3x_1 + 2x_2 + 7x_3 = 0 \\ -4x_1 + 3x_2 + 9x_3 = 0 \end{cases}$

b) $\begin{cases} x_1 + 2x_2 = 0 \\ 3x_1 - 2x_2 = -2 \\ -4x_1 + 3x_2 + 9x_3 = 0 \end{cases}$

c) $\begin{cases} x_1 + 2x_2 = 1 \\ 3x_1 + 2x_2 = -7 \\ -4x_1 + 3x_2 = 9 \end{cases}$

d) None of the above.

Answer: (c)

86. If $\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 5$ then $\begin{vmatrix} a & b & c \\ 3d & 3e & 3f \\ g & h & i \end{vmatrix}$ will be:

a) 15

b) 45

c) 135

d) 60.

Answer: (a)

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87. For an n x n matrix $(A^t)^t =$

a) A^t

b) A^{-1}

c) A

d) None of the above.

Answer: (c)

88. Reduced echelon form of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}$ is:

a) $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 1 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 0 & -2 \\ 0 & 0 & 1 \end{bmatrix}$

Answer: (b)

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91. If Ax = b is a system of n linear equations in n unknowns such that det (A)≠ 0, then the system has:

- **a)** Infinitely many solutions.
- **b)** Unique solution.
- **c)** Both (a) and (b).
- **d)** None of the above.

Answer: (b)

92. Given the system $\begin{cases} x_1 + x_3 = 6 \\ -3x_1 + 4x_2 + 6x_3 = 30 \\ -x_1 - 2x_2 + 3x_3 = 8 \end{cases}$ the augmented matrix for the system is:

- **a)** $\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -7 \\ -4 & 3 & 9 \end{bmatrix}$
- **b)** $\begin{bmatrix} 1 & 1 & 0 & 6 \\ -3 & -4 & 6 & -30 \\ 1 & 2 & 3 & 8 \end{bmatrix}$
- **c)** $\begin{bmatrix} 1 & 0 & -1 & 6 \\ -3 & 4 & 6 & 30 \\ -1 & -2 & 3 & 8 \end{bmatrix}$
- **d)** $\begin{bmatrix} 1 & 0 & 1 & 6 \\ -3 & 4 & 6 & 30 \\ -1 & -2 & 3 & 8 \end{bmatrix}$

Answer: (d)