

MTH501 Midterm Solved MCQS By Junaid

Linear Algebra (Virtual University of Pakistan)



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MTH501-Linear algebra Mid TERM Solved MCQS Prepared by: JUNAID MALIK

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1. If the determinant of the matrix $A = \begin{bmatrix} 1 & 3 & 5 \\ 3 & 1 & 1 \\ 5 & 7 & 7 \end{bmatrix}$ is 32 and the matrix B is obtained by

multiplying any row of A with an integer value 4, then which of the following is true for the matrix B?

JINCA

Its determinant is 128.

2. Let V be a five-dimensional vector space, and let S be a subset of V which spans V. Then S

Must have at most five elements

3. The Elementary Row operations: $[R_2 \rightarrow R_2 \rightarrow 4R_1]$ and $[R_3 \rightarrow R_3 \rightarrow 6R_1]$ are

performed on to get $\begin{pmatrix} 1 & 2 & -5 \\ -4 & 1 & -6 \\ 6 & 3 & -4 \end{pmatrix} \sim ----?$ Answer $\begin{pmatrix} 1 & 2 & -5 \\ 0 & 1 & 26 \\ 0 & -9 & -26 \end{pmatrix}$

4. Let A and B be the square matrices. Then A and B are invertible with $B = A^{-1}$ and $A = B^{-1}$ if and only if AB = AB equals to a (an) _____ matrix.

Identity

5. If λ is an eigenvector of A, then every nonzero vector x such that Ax = λ x is called an ______ of A corresponding to ______.

Eigenvector, λ

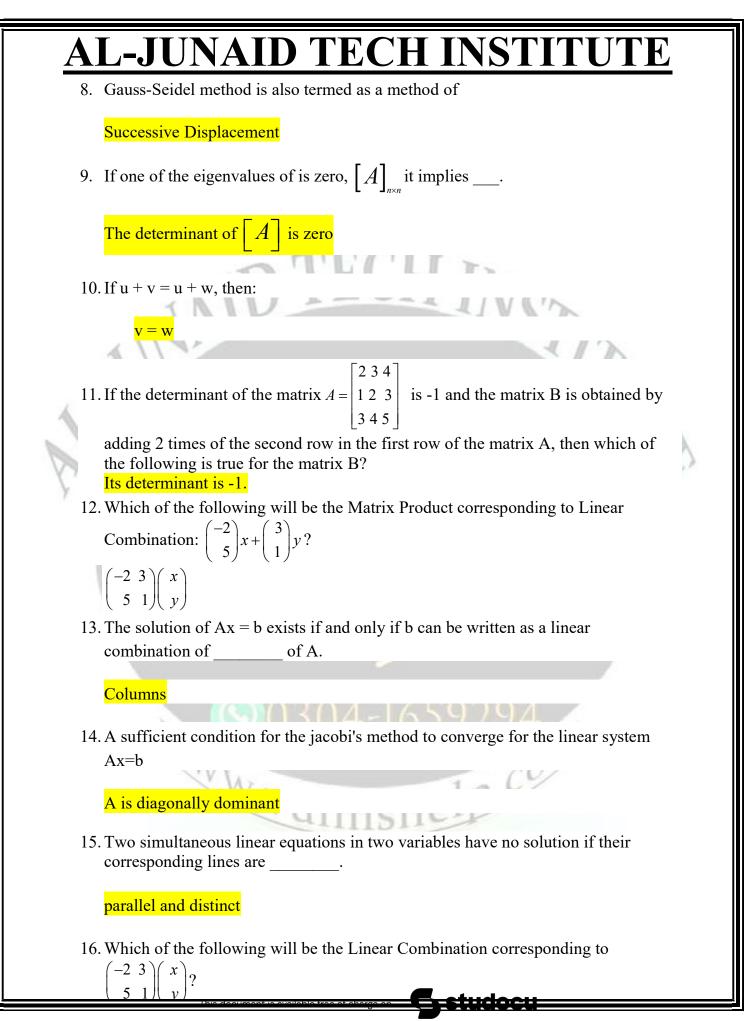
6. If x + 2 is a factor of the characteristic polynomial of matrix C then an eigenvalue of C is

VIII mahall'

<mark>-2</mark>

7. Let A be $n \times n$ matrix, then A is invertible if and only if

det A is not zero



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17. If a homogeneous system Ax = 0 has a trivial solution, then which of the following is (are) the value(s) of the vector x?

1

<mark>0</mark>

18. A square matrix A is said to be diagonal if A is similar to a matrix

- 11

Diagonal matrix

Answer $\begin{pmatrix} -2\\5 \end{pmatrix} x + \begin{pmatrix} 3\\1 \end{pmatrix} y$

19. Why inverse of the matrix A = [1 2] is NOT possible?

Because it is a saquare matrix

20. Which of the following Elementary Row operations would perform in order to

I NTO

I DIA

 $get \begin{pmatrix} 1 & 2 & -5 \\ -4 & 1 & -6 \\ 6 & 3 & -4 \end{pmatrix} \sim \begin{pmatrix} 1 & 2 & -5 \\ 0 & 9 & -36 \\ 0 & -9 & 26 \end{pmatrix}?$ $R_2 \rightarrow R_2 + 4R_1, R_3 \rightarrow R_3 \rightarrow 6R_1$

21. What is the maximum possiblle number of pivots in a 6×6 matrix?

<mark>6</mark>

22. A homogeneous linear system always has the trivial solution: there are only two possibilities for its solutions:

The system has infinitely much solutionsnin addition to trivial solution

<mark>Zero</mark>

24. In A is a square matrix, then the minor of entry ith row and jth column is to be the determinant of the sub matrix that remains when the ith row and jth column of A are

<mark>Added</mark>

25.7x is an algebraic term in which 7 is a _____ and x is a _____.

coefficient_variable

26. Which of the following is the coefficient matrix for the

 $x_{1} - 2 x_{2} + x_{3} = 0$ system $2 x_{2} - 7 x_{3} = 8$ $-4 x_{1} + 3 x_{2} + 9 x_{3} =$ Answer $\begin{bmatrix} 1 - 2 & 1 \\ 0 & 2 - 7 \\ -4 & 3 & 9 \end{bmatrix}$

27. Let 'Ax = 0' be a homogeneous linear system of 'n' equations and 'n' unknowns. Then, the coefficient matrix 'A' is invertible if and only if this system has solution.

Trivial

28. Two simultaneous linear equations in two variables have no solution if their corresponding lines are

Parallel and distinct

29. The solution of Ax = b exists if and only if b can be written as a linear combination of ______ of A.

<mark>Columns</mark>

30. Let V be a five-dimensional vector space, and let S be a subset of V which spans V. Then S

Must have at most five elements

31. Gauss-Seidel method is also termed as a method of

Successive Displacement

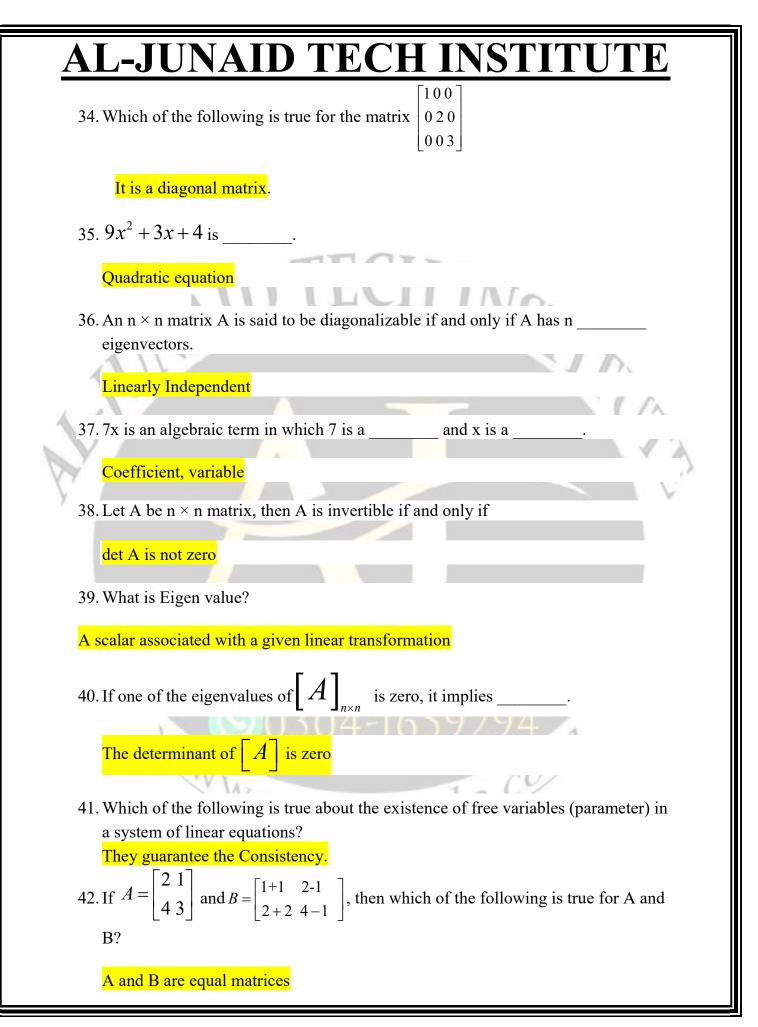
32. If A be the standard matrix of linear transformation $T : \mathbb{R}^n \to \mathbb{R}^m$, then which of the following is true for the mapping from \mathbb{R}^n onto \mathbb{R}^m ?

The columns of A R^m span.

33. If T be a transformation, then which of the following is true for its linearity?

 $T(cu^r + dv^r): cT^r(u^r) + dT(v^r)$ where 'c' and 'd' are scalars

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43. If the determinant of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 3 & 4 & 5 \end{bmatrix}$ is -1 and the matrix B is obtained

by adding 2 times of the second row in the first row of the matrix A, then which of the following is true for the matrix B?

HI HI D.

234

Its determinant is -1.

44. If $Ax^{t} = b^{r}$ and factorization of A is LU, then which of the following pair of equations can be used to solve $LUx^{t} = b^{r}$ for value of ' X^{r} '?

 $Ux^t = y^r$ and $LY^r = b^r$

45. A sufficient condition for the jacobi's method to converge for the linear system Ax=b

A is diagonally dominant

46. Why inverse of the matrix A = [1 2] is NOT possible?

Because it is a saquare matrix

47. A 3 \times 3 identity matrix have three and _____

eigen values.

<mark>Same</mark>

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

AX=0

49. Let A be the matrix of order 2x3 and B be the matrix of order 3x5, and then which of the following is the order of the matrix AB?

Lausura

2x5

50. A homogeneous linear system always has the trivial solution: there are only two possibilities for its solutions:

The system has infinitely many solutionsnin addition to trivial solution

51. What is the maximum possiblle number of pivots in a 6 × 6 matrix?6

52. How many Pivot partitions the matrix: $\begin{pmatrix} 2 & 3 & 1 \\ 4 & 6 & 2 \end{pmatrix}$ will have?

53. If, $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & k & 1 \end{bmatrix}$ then which of the following is true for the matrix?

54. If v_1^r, v_2^r , and v_3^r are in \mathbb{R}^n then which of the following is equivalent to $(v_1, v_2, v_3) \begin{bmatrix} 2 \\ -7 \\ 5 \end{bmatrix}$

$$\left(2v_1^r-v_2^r+v_3^r\right)$$

2

det(A) = 1

55. For any subspace W of a vector space V, which one is not the axiom for subspace.

For all u, v in W and u - v must be in W.

56. Which one is not the axiom for vector space? 0.u = u

57. The Gauss-Seidel method is applicable to strictly diagonally dominant matrix. TRUE

58. At what condition det(AB)=(detA)(detB) is possible? When A and B are n x n matrices

60. If a multiple of one row of a square matrix A is added to another row to produce a matrix B, then which of the following condition is true?

detB = detA

61. The Jacobi's method is a method of solving a matrix equation on a matrix that has no zeros along its main diagonal.

TRUE

62. While using the Cramer's rule, if determinant D = 0, and other determinant is not zero then how many solutions are there?

No solution

63. Which of the following is all permutations of $\{1,2\}$?

(1, 2, 2, 1)

64. By using determinants, we can easily check that the solution of the given system of linear equation exits and it is unique.

TRUE

65. If a multiple of one row of a square matrix A is added to another row to produce a matrix B, then which of the following condition is true?

detB = k detA

66.

At what condition the Cramer's formula is valid for linear systems? When matrix is n x n

- 67. A matrix has not the same determinant if we add a multiple of a column to another column. TRUE
- 68. The Jacobi's method is a method of solving a matrix equation on a matrix that has no zeros along its main diagonal.

<mark>TRUE</mark>

69. Which of the following is the volume of the parallelepiped determined by the

det A

zero

- 70. For any 3x3 matrix A where det (A) = 3, then det (2A) =_____
- <mark>6</mark> 71.
 - Which one is not the axiom for vector space? 0.u = u
- 72. Which of the following is NOT the axiom for vector space where u, v, w in V are set ovectors and l, m, n are scalars?u.v =v.u
- 73. If two rows or columns of a square matrix are identical, then det (A)wil be
- 74. If A is strictly diagonally dominant, then A is ______ invertible
- 75. The Gauss-Seidel method is applicable to strictly diagonally dominant matrix. TRUE
- 76. If the absolute value of each diagonal entry exceeds the sum of the absolute values of the other entries in the same row then a matrix A is called: strictly diagonally dominant
- 77. The Jacobi's method is a method of solving a matrix equation on a matrix that has no zeros along its main diagonal.
 TRUE
- 78. Which one is not the axiom for vector space? 0.u = u
- 79. Let W = {(x, y) such that x, y in R and x = y}. Is W a vector subspace of plane.: YES
- 80. If A is a triangular matrix, then det(A) is the product of the entries on the

Main diagonal of A

81. By using determinants, we can easily check that the solution of the given system of linear equation exits and it is unique.

TRUE

82. If a matrix A is invertible than adj(A) is also invertible.

1000

TRUE

83. If all the entries of a row or a column of a square matrix are zero, then det (A) will be _____.

<mark>Zero</mark>

84. Consider a system of linear equations A x = b where A is a3 $\times 3$ matrix having 3 pivot positions, then which

Statement is false about the system Ax = b

There is only one free variable in solution of that system.

85. If a finite set S of non zero vectors span a vector space V, then some subset of S is a basis for V.

<mark>false</mark>

- 86. If rank of a3 x 5 matrix is 3 then dimension of its Null space is 0
- 87. If matrix A has zero as an eigenvalue then which statement(s) about A must be true.

I. Matrix A is not invertible.

- II. Matrix A will also have an eigenvalue 2.
- III. Matrix is diagonalizable.

<mark>I only</mark>

- 88. Determinant of a non-invertible(singular) matrix always Vanish
- 89. Rank of a zero matrix of any order is

Zero

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90. A matrix A and its transpose have the same determinant.

True

91. If a system of equations is solved using the Jacobi's method, then which of the following is the most appropriate answer about the matrix M that is derived from the coefficient matrix ?

All of its entries above the diagonal must be zero.

92. If A is a square matrix, then the Minor of entry I th row and j th column is to be the determinant of the sub matrix that remains when the I th row and j th column of A are:

Deleted

93. If M=[3] then which of the following is the determinant of the matrix M? Select correct option:

94. Which of the following is all permutations of $\{1,2\}$?

(1, 2, 2, 1)

95. If M is a square matrix having two rows equal then which of the following about the determinant of the matrix is true?

det (M)=0

96. If a system of equations is solved using the Gauss-Seidel method, then which of the following is the most appropriate answer about the matrix M that is derived from the coefficient matrix ?

All of its entries above the diagonal must be zero.

97. Let W = {(1, y) such that y in R}. Is W a vector subspace of plane. Select correct option:

<mark>NO</mark>

98. At what condition the Cramer's rule fails?

When the determinant of the coefficient matrix is zero

99. All the lines those passes through origin are not the subspace of a plane.

FALSE

100. A matrix A and its transpose have the same determinant.

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101.	Cramer's rule is a formula for solving systems of equations by
102.	Determinants If a system of equations is solved using the Jacobi's method , then which of
the f	Following is the most appropriate answer about the matrix M that is derived to the coefficient matrix ?
All	of its entries below the diagonal must be zero
103.	Which of the following is all permutations of {1,2}?
<mark>(1,2)</mark>) and (2,1)
104.	Determinant of a non-invertible(singular) matrix always
- A ().	
Van	ish
105.	Rank of a zero matrix of any order is
Zer	0
106. <mark>A</mark>	For an $n \times n$ matrix (At) t =
107.	What is the largest possible number of pivots a 4×6 matrix can have?
<mark>4</mark>	
108.	The characteristic polynomial of a 5×5 matrix is
λ^5	$3^{5}-4\lambda^{4}-45\lambda^{3}$, the eigenvalues are
	0,-5, 9
109.	A is diagonalizable if $A = PDP^{-1}$ Where
<mark>D is</mark>	a diagonal matrix and P is invertible matrix
110.	The inverse of an invertible lower triangular matrix is
Lower t	riangular matrix
111. P}	If P is a parallelepiped in R3 , then {volume of T (P)} = $ detA $. {Volume of
	Where T is determined by a 3 *3 matrin A

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- 112. Let A be a^{n*m} matrix of rank then row space of A has dimension
 - R

<mark>4</mark>

113.

The dimension of the vector space p_4 is

114. Let $\begin{bmatrix} u = (3, -2), V = (4, 5) \end{bmatrix}$. For the weighted Euclidean inner $\langle u, v \rangle = 4u_1v_1 + 5u_2v_2$ product $\langle u, v \rangle$

- 115. Let A be n*n matrix whose entries are real. If λ is an eigenvalue of A with X a corresponding eigenvector in Cⁿ, then
 - Ax=λ x
- 116. Which one is the numerical method used for approximation of dominant eigenvalue of a matrix

Guass Seidal method

117. The matrix equation represents a system of linear equations commonly referred to as the

Normal equations for \hat{x}

- ^{118.} Let have eigenvalues 2, 5, 0,-7, and -2. Then the dominant eigenvalue for A is $\lambda = -7$
- ^{119.} If W is a subspace of \mathbb{R}^m , then the transformation $T: \mathbb{R}^m \to W$ that maps each vector x in \mathbb{R}^m into its orthogonal x in W is called the orthogonal projection of

 R^m In W

^{120.} Which statement about the set S is false where $S = \{(1, 1, 3), (2, 3, 7), (2, 2, 6)\}$ The Set S is linearly independent.

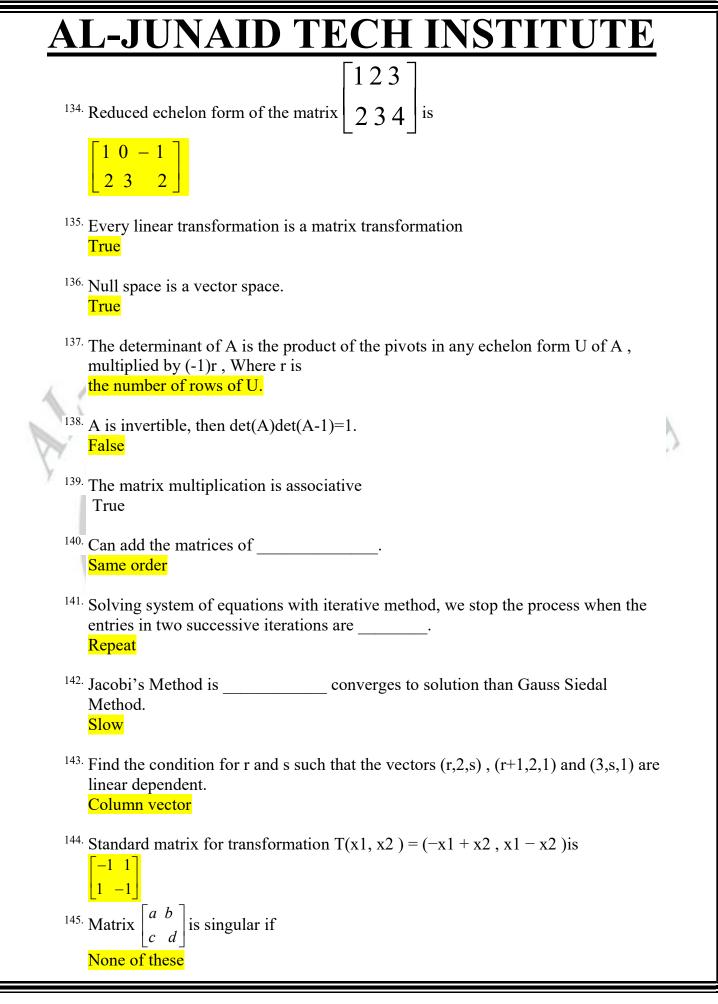
- ^{121.} How many subspaces R2 have? Infinitely many
- ^{122.} The set of vectors {(5,0,0), (7,2,-6), (9,4,-8)} is, Linearly dependent
- ^{123.} is a 2 * 2 matrix, the area of the parallelogram determined by the columns of A is det A
- ^{124.} transpose of an lower triangular matrix is Upper triangular matrix
- ^{125.} A be a square matrix of order 3 * 3 with det(A) =21 , then det(2 A) = 168
- ^{126.} Basis is a linearly independent set that is as large as possible. True
- ^{127.} A be an m \times n matrix. If for each b in m \mathbb{R}^m the equation Ax=b has a solution then A has pivot position in only one row (may be this option is true)
- ^{128.} equation x = p + t v describes a line Through origin parallel to p
- ^{129.} A be an m \times n matrix. If for each b in m \mathbb{R} the equation Ax=b has a solution then A has pivot position in only one row

$$x_1 - 2x_2 + x_3 = 8$$

^{130.} Given the system $2x_2 - 7x_3 = 0$ the augmented matrix for the system is $-4x_1 + 3x_2 + 9x_3 = -6$

^{133.} Each Linear Transformation T from Rⁿ to R^m is equivalent to multiplication by a matrix A of order n'm

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^{146.} All the lines those passes through origin are not the subspace of a plane. FALSE

- ^{147.} Why inverse of the matrix $A=[1 \ 2]$ is NOT possible? Because it is a rectangular matrix.
- ^{148.} Let $W = \{(1, y) \text{ such that } y \text{ in } R\}$. Is W a vector subspace of plane. NO
- ^{149.} If M is a square matrix having two rows equal then which of the following about the determinant of the matrix is true? det (M)=0

^{150.} If a system of equations is solved using the Jacobi's method, then which of the following is the most appropriate answer about the matrix M that is derived from the coefficient matrix ?All of its entries below and above the diagonal must

All of its entries below and above the diagonal must

- ^{151.} Which of the following is the volume of the parallelepiped determined by the columns of A where A is a 3 x 3 matrix?[det A]
- ^{152.} If all the entries of a row or a column of a square matrix are zero, then det (A) will be _____.

<mark>Zero</mark>

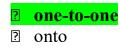
^{153.} If both the Jacobi and Gauss-Seidel sequences converge for the solution of Ax=b, for any initial x(0), then which of the following is true about both the solutions? Unique solution

^{154.} How many different permutations are there in the set of integers {1, 2, and 3}?
 8

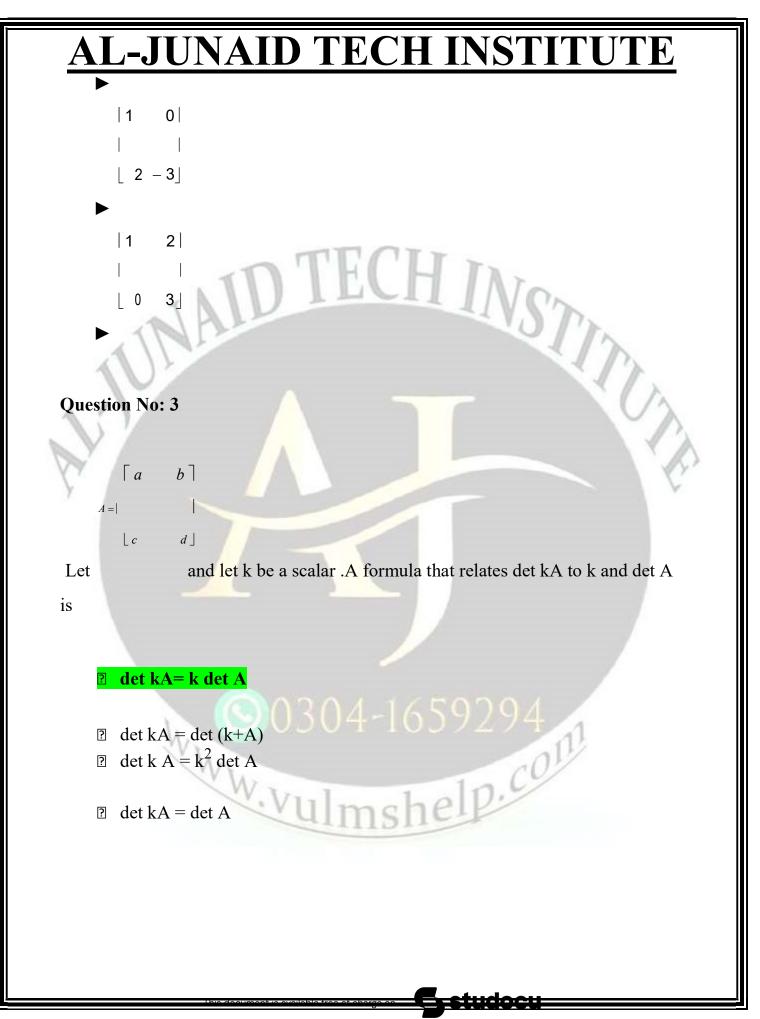
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Question No: 1

If for a linear transformation the equation T(x)=0 has only the trivial solution then T is







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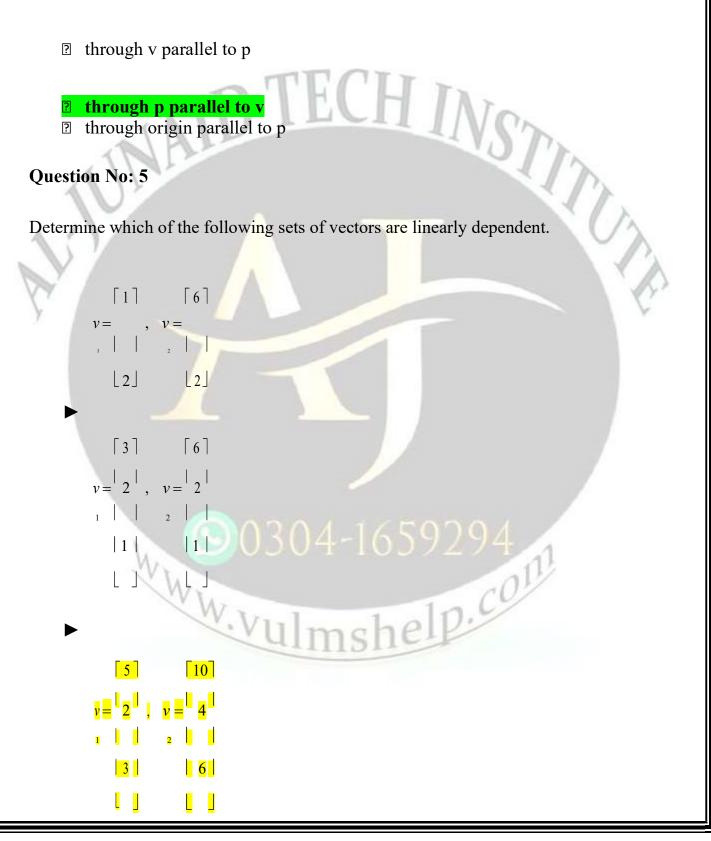
Question No:

The equation x = p + t v describes a line

- Ithrough v parallel to p
- ?

Question No: 5

Determine which of the following sets of vectors are linearly dependent.



Question No: 6

Every linear transformation is a matrix transformation



P False

Ouestion No: 7

A null space is a vector space.

True P False **Question No: 8**

nau. If two row interchanges are made in succession, then the new determinant

equals to the old determinant ?

equals to -1 times the old determinant

```
Ouestion No: 9
```

The determinant of A is the product of the pivots in any echelon form U of A , multiplied by $(-1)^r$, Where r is

```
the number of rows of A
?
    2 the number of row interchanges made during row reduction from A to
U
      the number of rows of U
?
      the number of row interchanges made during row reduction U to A
?
Question No: 10
                                  nshelp.col
If A is invertible, then det(A)det(A^{-1})=1.
    ► True
    ► False
```

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Question No: 11

The product of upper triangular matrices is

? lower triangular matrix Image: upper triangular matrix I diagonal matrix **Question No: 12**

The matrix multiplication is associative

True P False

Question No: 14

We can add the matrices of

same order

same number of columns. ?

- same number of rows
- ⑦ different order

Question No: 15

By solving system of equations with iterative method, we stop the process when the entries in two successive iterations are

- ? repeat
- w.vulmshelp.com large difference
- I different



Question No: 16

Jacobi's Method is ______ converges to solution than Gauss Siedal

Method.

- ₿ slow
- ? fast
- Detter

Question No: 17

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

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 $\mathbf{P} \mathbf{AX} = \mathbf{B}$? AX=0 ? AB=X $X = A^{-1}$

Question No: 18

The row reduction algorithm applies only to augmented matrices for a linear system.

? True

False

ww.vulmst **Question No: 19**

Whenever a system has no free variable, the solution set contains many solutions.

relp.com

P True

False



Question No: 21

If a system of equations is solved using the Gauss-Seidel method, then which of the following is the most appropriate answer about the matrix M that is derived from the coefficient matrix ? TITUM

All of its entries on the diagonal must be zero.

All of its entries below the diagonal must be zero.

All of its entries above the diagonal must be zero.

All of its entries below and above the diagonal must be zero.

Question No: 22

The determinant of a diagonal matrix is the product of the diagonal elements.

Select correct option:



7.CON

FALSE **Ouestion No: 23**

By using determinants, we can easily check that the solution of the given system of linear equation exits and it is unique.



TRUE

Question No: 24

A matrix A and its transpose have the same determinant.



Question No: 25

If both the Jacobi and Gauss-Seidel sequences converge for the solution of Ax=b, for any initial x(0), then which of the following is true about both the solutions?

TITUT

p.coll

No solution

- Unique solution
- Different solutions
- Infinitely many solutions 0304-1659294

Question No: 26

The value of the determinant of a square matrix remains unchanged if we multiply each element of a row or a column by some scalar.



Question No: 27

How many different permutations are there in the set of integers $\{1,2,3\}$?

- ≥ 2
- 4
- > 6

Question No: 28

TECH INSTITUT If A is n x n matrix and det (A) = 2 then det (5A) =

32 5

Question No: 29

Every vector space has at least two subspaces; one is itself and the second is:

- multiplication of vectors
- ۶ addition of vectors
- subspace {0}
- ulmshelp.com scalar multiplication of vectors

Question No: 30

:ow of A is .. ing condition is true: det(AB) = (detA)(detB)If one row of A is multiplied by k to produce B, then which of the following condition is true?

- \blacktriangleright detB = detA

Question No: 1

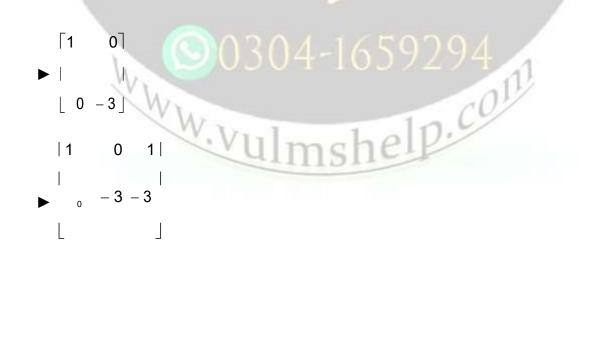
If for a linear transformation the equation T(x) = 0 has only the trivial solution then T is

One-to-one

? Onto

Question No: 2

Which one of the following is an elementary matrix?



- \bigcirc det kA= k det A \bigcirc det kA = det (k+A)
- \square det k A = k² det A



Ouestion No: 22

Cramer's rule leads easily to a general formula for

- **D** the inverse of n x n matrix A

the inverse
the adjugate of an max.
the determinant of an matrix A

Question No: 23
The transpose of a lower triangular matrix is
The transpose of a lower triangular matrix
The transpose of a lower triangular matrix

Ouestion No: 24

The transpose of an upper triangular matrix is

Iconstruction Lower triangular matrix

- Upper triangular matrix
- Diagonal matrix

Ouestion No: 25

Let A be a square matrix of order 3x3 with det (A)=21, then Det (2A)

- 168 ? 2 186 21
- **126**

Question No: 26

A basis is a linearly independent set that is as large as possible.

? True P False **Question No: 27** ww.vulmshelp.com

Let A be an n X n matrix. If for each b in the equation Ax=b has a solution then

A has pivot position in only one row.

- Columns of A span
- Rows of A span

Ouestion No: 28

If the columns of A are linearly independent, then

- **Columns of A span Rn**
- Rows of A span Rn
- A has a pivot only in one row

Question No: 29

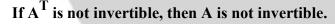
The determinant of a triangular matrix is the sum of the entries of the main diagonal.

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True

False

Question No:30





 \triangleright www.vulmshelp.com False Question #1 of 10

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Two vectors u and v are orthogonal to each other if _

Select correct option:

<mark>u . v = 0</mark>

u.v=1

- u + v = 0
- u v = 0

Question # 2

D TECH INSTITUTE If the columns of a matrix are linearly independent then the matrix is _

Select correct option:

invertible (A) is INVERTIBLE IF A has linearly independent COLUMNS in Matrics.

symmetric

antisymmetric

singular

Question # 3

If the columns of a matrix are then the matrix is invertible.

Select correct option:

linearly independent (A) is INVERTIBLE IF A has linearly independent COLUMNS in Matrics. w.vulmshelp.co

linearly dependent

Question #4

An n x n matrix A is ______ if and only if A has n linearly independent vectors.

Select correct option:

diagonalizable

<mark>singular</mark> not sure

symmetric

scalar

Question # 7

Two vectors are ______if at least one of the vector is a multiple of the other

TTUN

Select correct option:

<mark>linearly independent</mark> Page no 89

linearly dependent

Question # 8

An n x n matrix with n distinct eigen values is diagonalizable.

Select correct option:

TRUE Page no 402

FALSE

Question # 9

2x - 3y = -2 4x + y = 24 The above system has a ______ solution.

Select correct option:

inconsistant

many

unique

trivial

Question # 1

Two vectors u and v are orthogonal to each other if _____

Select correct option:

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AL-JUNAID TECH INSTITUTE $\mathbf{u} \cdot \mathbf{v} = \mathbf{0}$

ECHIN

u . v = 1

- u + v = 0
- u v = 0

Question # 2

If the columns of a matrix are linearly independent then the matrix is

invertible (A) is *INVERTIBLE IF* A has linearly independent *COLUMNS* in Matrics.

symmetric

antisymmetric

singular

Question # 3

If the columns of a matrix are then the matrix is invertible.

linearly independent (A) is INVERTIBLE IF A has linearly independent COLUMNS in Matrics.

linearly dependent

Question # 4

An n x n matrix A is if and only if A has n linearly independent vectors.

diagonalizable

angular not (
<mark>singular</mark> not :	sur	E

symmetric

scalar

Question #7

Two vectors are ______ if at least one of the vector is a multiple of the other

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linearly independent Page no 89

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linearly dependent

Question # 8

An n x n matrix with n distinct eigen values is diagonalizable.

Select correct option:

TRUE Page no 402

FALSE

Question #9

Igen values . 2x - 3y = -2 4x + y = 24 The above system has a _____ solution.

inconsistant

many

unique

trivial

Question # 10

An n x n matrix A is if and only if 0 is not an eigen value of

invertible In invertible Matrix Theorem.. The **n** × **n** matrix A is invertible *if and*

only if 0 is not an eigenvalue of A

singular

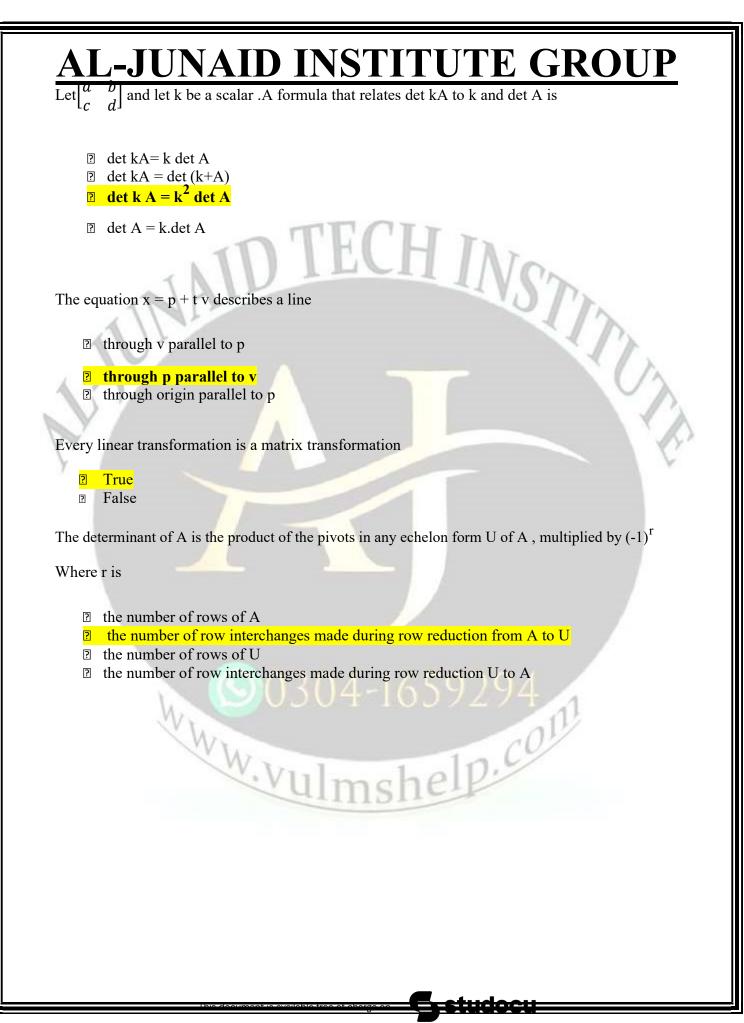
symmetric

scalar

If for a linear transformation the equation T(x) = 0 has only the trivial solution then T is

D.CON

One-to-one ? ? Onto



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