

Linear Algebra (MTH501)

Question: 3 (Marks: 1)

Attempted Questions: 2 Total Questions: 52

If u, v and w are vectors in a real inner product space, and k is any scalar, then which one of the following is not a property for the inner product space

Choices:

$$\langle u, v-w \rangle = \langle u, w \rangle - \langle u, v \rangle$$

Masters

$$\langle u, v-w \rangle = -\langle u, w \rangle + \langle u, v \rangle$$

$$\langle u, v-w \rangle = \langle u, v \rangle - \langle u, w \rangle$$

Linear Algebra (MTH501)

Question: 4 (Marks: 1)

Attempted Questions: 4 Total Questions: 52

$$A = \begin{bmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The dominant eigenvalue for the matrix is

Choices:

$\lambda = 1$

$\lambda = 0$

$\lambda = -2$

Masters

$\lambda = 2$

Linear Algebra (MTH501)

Question: 1 (Marks: 1)

Attempted Questions: 0 Total Questions: 52

Let \mathbb{R}^3 have the Euclidean inner product. Then $u = (2, 1, 3), v = (1, 7, k)$ are orthogonal for

Choices:

$k = 9$

$k = -3$

Masters

$k = -9$

$k = 3$

Linear Algebra (MTH501)

Question: 2 (Marks: 1)

Attempted Questions: 1 Total Questions: 52

The QR-Decomposition of a 5×2 matrix A gives

Choices:

matrix Q of order 5×1 and R of order 5×1

matrix Q of order 5×2 and R of order 2×5

matrix Q of order 5×2 and R of order 2×2

Masters

Linear Algebra (MTH501)

Question: 7 (Marks: 1)

Attempted Questions: 6 Total Questions: 52

$$2x + 3y = 3$$

$$6x + 9y = 7$$

The given system has

Choices:

Unique solution

Infinitely many solutions

No solution

Masters

None of these

Linear Algebra (MTH501)

Question: 5 (Marks: 1)

Attempted Questions: 5 Total Questions: 52

If two rows are orthogonal, they are _____.

Choices:

linearly independent

Masters

linearly dependent

Linear Algebra (MTH501)

Question: **6** (Marks: 1)

Attempted Questions: **6**

Total Questions: **52**

If x is orthogonal to both u and v , then x must be _____ to $u + v$.

Choices:

orthogonal

Masters

orthonormal

perpendicular

parallel

Linear Algebra (MTH501)

Question: 10 (Marks: 1)

Attempted Questions: 10 Total Questions: 52

If $v_1 = (2, 2, 2)$, $v_2 = (0, 0, 3)$ and $v_3 = (0, 1, 1)$ span \mathbb{R}^3 , then which of the following is true for any arbitrary $\vec{b} = (b_1, b_2, b_3) \in \mathbb{R}^3$?

Choices:

$$(0, 1, 1) = k_1(b_1, b_2, b_3) + k_2(2, 2, 2) + k_3(0, 0, 3)$$

$$(b_1, b_2, b_3) = k_1(2, 2, 2) + k_2(0, 0, 3) + k_3(0, 1, 1)$$

Masters

$$(0, 0, 3) = k_1(2, 2, 2) + k_2(b_1, b_2, b_3) + k_3(0, 1, 1)$$

$$(0, 1, 1) = k_1(2, 2, 2) + k_2(0, 0, 3) + k_3(b_1, b_2, b_3)$$

Linear Algebra (MTH501)

Question: 10 (Marks: 1)

Attempted Questions: 10 Total Questions: 52

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Choices:

$$(0, 1, 1) = k_1(b_1, b_2, b_3) + k_2(2, 2, 2) + k_3(0, 0, 3)$$

$$(b_1, b_2, b_3) = k_1(2, 2, 2) + k_2(0, 0, 3) + k_3(0, 1, 1)$$

Masters

$$(0, 0, 3) = k_1(2, 2, 2) + k_2(b_1, b_2, b_3) + k_3(0, 1, 1)$$

$$(0, 1, 1) = k_1(2, 2, 2) + k_2(0, 0, 3) + k_3(b_1, b_2, b_3)$$

Linear Algebra (MTH501)

Question: 8 (Marks: 1)

Attempted Questions: 7 Total Questions: 52

If a system of linear equations is inconsistent then it has _____.

Choices:

infinite solutions

finite solutions

unique solution

no solution

Masters

Linear Algebra (MTH501)

Question: 12 (Marks: 1)

Attempted Questions: 12 Total Questions: 52

$$A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 1+1 & 2-1 \\ 2+2 & 4-1 \end{bmatrix}$$

If A and B are equal matrices, then which of the following is true for A and B ?

Choices:

A and B are equal matrices.

Masters

A is the transpose of B .

B is the transpose of A .

B is the multiplicative inverse of A .

Linear Algebra (MTH501)

Question: **13** (Marks: 1)Attempted Questions: **13** Total Questions: **52**

$$A = \begin{bmatrix} 4 & -1 \\ 5 & 3 \end{bmatrix}$$

If $A = \begin{bmatrix} 4 & -1 \\ 5 & 3 \end{bmatrix}$, then which of the following is the value of $\det(A)$?

Choices:

7

-17

17

Masters

11

Linear Algebra (MTH501)

Question: 11 (Marks: 1)

Attempted Questions: 11 Total Questions: 52

If $\vec{v}_1 \neq c \vec{v}_2$ (where 'c' is any scalar), then which of the following is true ?

Choices:

$\{\vec{v}_1, \vec{v}_2\}$ is linearly dependent.

$\{\vec{v}_1, \vec{v}_2\}$ is linearly independent.

Masters

\vec{v}_1 and \vec{v}_2 lie on the same line.

\vec{v}_1 and \vec{v}_2 are parallel.

Linear Algebra (MTH501)

Question: 12 (Marks: 1)

Attempted Questions: 12 Total Questions: 52

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Choices:

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Masters

A is the transpose of B .

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Linear Algebra (MTH501)

Question: **13** (Marks: 1)Attempted Questions: **13** Total Questions: **52**

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Linear Algebra (MTH501)

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Attempted Questions: 11 Total Questions: 52

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\vec{v}_1 and \vec{v}_2 are parallel.

Linear Algebra (MTH501)

Question: **15** (Marks: 1)Attempted Questions: **14** Total Questions: **52**

$$A = \begin{bmatrix} 2 & 3 & 5 \\ 0 & 3 & 6 \\ 0 & 0 & 4 \end{bmatrix}$$

If A^{-1} exists, then which of the following is the value of $\det(A)$?

Choices:

6

18

24

Masters

36

Linear Algebra (MTH501)

Question: 9 (Marks: 1)

Attempted Questions: 9 Total Questions: 52

If a matrix $A = [1 \ 2 \ 3]$, then which of the following is true for A ?

Choices:

It is a column matrix.

It is a row matrix.

Masters

It is 3×3 matrix.

It is a square matrix .

Linear Algebra (MTH501)

Question: 14 (Marks: 1)

Attempted Questions: 13 Total Questions: 52

$$A = \begin{bmatrix} 1 & 2 & 0 & 0 & 0 & 0 \\ -1 & 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 3 & 5 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3 & -2 \\ 0 & 0 & 0 & 0 & 2 & 1 \end{bmatrix}$$

If the matrix A is partitioned into square sub-matrices, then which of the following is true for matrix A ?

Choices:

 It is a block diagonal matrix.

Masters

 It is a block upper triangular matrix.

 It is a diagonal-constant matrix.

 Partitioning is not possible in the matrix A .

Linear Algebra (MTH501)

Question: **15** (Marks: 1)

Attempted Questions: **14** Total Questions: **52**

$$A = \begin{bmatrix} 2 & 3 & 5 \\ 0 & 3 & 6 \\ 0 & 0 & 4 \end{bmatrix}$$

If $A^{-1} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$, then which of the following is the value of $\det(A)$?

Choices:

6

18

24

Masters

36

Linear Algebra (MTH501)

Question: 9 (Marks: 1)

Attempted Questions: 9

Total Questions: 52

If a matrix $A = [1 \ 2 \ 3]$, then which of the following is true for A ?

Choices:

It is a column matrix.

It is a row matrix.

Masters

It is 3×3 matrix.

It is a square matrix .

Linear Algebra (MTH501)

Question: 14 (Marks: 1)

Attempted Questions: 13 Total Questions: 52

$$A = \begin{bmatrix} 1 & 2 & 0 & 0 & 0 & 0 \\ -1 & 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 3 & 5 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3 & -2 \\ 0 & 0 & 0 & 0 & 2 & 1 \end{bmatrix}$$

If the matrix A is partitioned into square sub-matrices, then which of the following is true for matrix A ?

Choices:

 It is a block diagonal matrix.

Masters

 It is a block upper triangular matrix.

 It is a diagonal-constant matrix.

 Partitioning is not possible in the matrix A .

Linear Algebra (MTH501)

Question: **18** (Marks: 1)

Attempted Questions: **18** Total Questions: **52**

If the set $V = \{0, 1, 2, 3\}$, then which of the following is true for it ?

Choices:

It is closed under operation of addition .

It is a vector space .

It is commutative under operation of addition .

It has an additive inverse of each element .

Masters

Linear Algebra (MTH501)

Question: 19 (Marks: 1)

Attempted Questions: 19 Total Questions: 52

$$A = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 4 & 3 & 1 & 2 \\ 1 & 2 & 5 & 3 \end{bmatrix}$$

Let $\text{Col}(A)$ and the column space of A is a subspace of \mathbb{R}^k , then which of the following is value of k ?

Choices:

1

2

3

Masters

4

Linear Algebra (MTH501)

Question: 17 (Marks: 1)

Attempted Questions: 16 Total Questions: 52

$$A = \begin{bmatrix} 4 & 2 & 3 \\ 1 & 3 & 5 \\ 2 & 1 & 4 \end{bmatrix}$$

If the matrix A , then which of the following is true for its (C_{12}) cofactor ?

Choices:

It is 7 .It is 6 .*Masters*It is 5 .It is -6 .

Linear Algebra (MTH501)

Question: 16 (Marks: 1)

Attempted Questions: 16 Total Questions: 52

$$A = \begin{bmatrix} 4 & 3 & 5 \\ 3 & 1 & 1 \\ 5 & 7 & 7 \end{bmatrix}$$

If the determinant of the matrix A 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 about the matrix B ?

Choices:

Its determinant is 18 .

Its determinant is -32 .

Its determinant is 128 .

Masters

The information is not sufficient to calculate the determinant.

Linear Algebra (MTH501)

Question: 21 (Marks: 1)

Attempted Questions: 21 Total Questions: 52

$$A = \begin{bmatrix} 1 & 3 & 2 & -1 & 5 \\ 2 & 2 & 1 & 1 & 4 \\ -1 & 4 & 1 & 2 & -3 \\ 3 & 5 & 3 & -4 & 2 \end{bmatrix}$$

Let \mathcal{B} , the row space of A is the subspace of \mathbb{R}^5 . Identify the set by which the row space of A is spanned?

Choices:

$$\{(1, 2, -1, 3), (3, 2, 4, 5), (2, 1, 1, 3), (-1, 1, 2, -4), (5, 4, -3, 2)\}$$

$$\{(1, 2, -1, 3), (2, 4, -2, 6), (2, 1, 1, 3), (-1, 1, 2, -4), (6, 3, 3, 9)\}$$

$$\{(1, 3, 2, -1, 5), (2, 6, 4, -2, 10), (-1, 4, 1, 2, -3), (-3, 12, 3, 6, -9)\}$$

$$\{(1, 3, 2, -1, 5), (2, 2, 1, 1, 4), (-1, 4, 1, 2, -3), (3, 5, 3, -4, 2)\}$$

Masters

Linear Algebra (MTH501)

Question: 20 (Marks: 1)

Attempted Questions: 20 Total Questions: 52

If $c_1 \vec{v}_1 + c_2 \vec{v}_2 + c_3 \vec{v}_3 + \dots + c_p \vec{v}_p = 0$ and vectors $\vec{v}_1, \vec{v}_2, \vec{v}_3, \dots, \vec{v}_p$ all are linearly independent then which of the following is true?

Choices:

$$c_1 = c_2 = c_3 = \dots = c_p = 0$$

Masters

$$c_1 \neq c_2 \neq c_3 \neq \dots \neq c_p \neq 0$$

$$c_1 \neq c_2 = c_3 = \dots = c_p \neq 0$$

$$c_1 \neq c_2 = c_3 = \dots = c_p = 0$$

Linear Algebra (MTH501)

Question: 22 (Marks: 1)

Attempted Questions: 22 Total Questions: 52

If the Casorati matrix is not invertible, then which of the following is the most appropriate option regarding the associated signals ?

Choices:

The signals are linearly independent .

The signals are linearly dependent .

The signals may or may not dependent .

Masters

The signals may or may not independent .

Linear Algebra (MTH501)

Question: **25** (Marks: 1)

Attempted Questions: **25** Total Questions: **52**

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 2 & 5 \\ 0 & 0 & 1 \end{bmatrix}$$

The eigenvalues of matrix are.....?

Choices:

2,5

2,1,5

0,2,1

Masters

2,1

Linear Algebra (MTH501)

Question: **23** (Marks: 1)

Attempted Questions: **23** Total Questions: **52**

If $\lambda + 3$ is a factor of the characteristic polynomial of a matrix C , then which of the following is the Eigenvalue of C ?

Choices:

3

-3

Masters

1/3

0

Linear Algebra (MTH501)

Question: **27** (Marks: 1)

Attempted Questions: **27** Total Questions: **52**

Let A be an $n \times n$ matrix. The number λ is an **eigenvalue** of A if there exists a _____ vector v such that $Av = \lambda v$

Choices:

non-zero

Masters

zero

non-positive

non-negative

Linear Algebra (MTH501)

Question: 28 (Marks: 1)

Attempted Questions: 28 Total Questions: 52

Which statement is FALSE.

Choices:

If $Ax = \lambda x$ for some real number λ then λ is known as eigenvalue of the matrix A.

The eigenvalues of any matrix are on its main diagonal.

In order to find the eigenvalues we solve the equation $|A - \lambda I| = 0$

Masters

An eigenspace of A is the Null space of some matrix.

Linear Algebra (MTH501)

Question: **26** (Marks: 1)

Attempted Questions: **26** Total Questions: **52**

$$A = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$$

If _____ is diagonalizable then A has 2 distinct eigenvalues.

Choices:

True

Masters

False

Linear Algebra (MTH501)

Question: **30** (Marks: 1)

Attempted Questions: **30** Total Questions: **52**

The orthogonal projection of y onto u is a scalar multiple of

Choices:

u

y

neither u nor y

both u and y

Masters

Linear Algebra (MTH501)

Question: **31** (Marks: 1)Attempted Questions: **31** Total Questions: **52**

The dimensions of the column space and the row space of an $m \times n$ matrix A are equal. This common dimension, the rank of A , also equals the number of pivot positions in A and satisfies the equation _____.

Choices:

$$\text{rank } A = n$$

$$\dim \text{Nul } A = n$$

$$\text{rank } A + \dim \text{Nul } A = n$$

Masters

$$\text{rank } A - \dim \text{Nul } A = n$$

Linear Algebra (MTH501)

Question: 24 (Marks: 1)

Attempted Questions: 24 Total Questions: 52

Suppose that $B = \{b_1, b_2\}$ is a basis for V and $C = \{c_1, c_2, c_3\}$ is a basis for W . Let

$$T : V \rightarrow W \quad T(b_1) = 5c_1 - 2c_2 + 3c_3$$

be a linear transformation with the property that

$$T(b_2) = 4c_1 - c_2 + 7c_3 \quad [T(b_1)]_C$$

and . Determine the value of ?

Choices:

$$\begin{bmatrix} 4 \\ -1 \\ 7 \end{bmatrix}$$

$$\begin{bmatrix} 5 \\ -2 \\ 3 \end{bmatrix}$$

Masters

$$\begin{bmatrix} 7 \\ -1 \\ 4 \end{bmatrix}$$

$$\begin{bmatrix} 3 \\ -2 \\ 5 \end{bmatrix}$$

Linear Algebra (MTH501)

Question: **33** (Marks: 1)

Attempted Questions: **33** Total Questions: **52**

Which of the following is true for R^2 ?

Choices:

R^2 represents set of all points on a line.

R^2 represents set of all points in a plane.

Masters

R^2 represents set of all points in a space.

R^2 represents set of all points in a circle.

Linear Algebra (MTH501)

Question: **34** (Marks: 1)

Attempted Questions: **34** Total Questions: **52**

A pivot position in a matrix A is a location that corresponds to an always _____ entry in the echelon form of A .

Choices:

leading

Masters

first

last

diagonal

Linear Algebra (MTH501)

Question: 32 (Marks: 1)

Attempted Questions: 32 Total Questions: 52

How many terms are there in the algebraic expression $8x^2 + \sqrt{9}x \times 25x^3$?

Choices:

4

3

2

Masters

1

Linear Algebra (MTH501)

Question: **36** (Marks: 1)

Attempted Questions: **35** Total Questions: **52**

If a homogeneous system $A\vec{x} = 0$ has a trivial solution, then which of the following is the value of the vector \vec{x} ?

Choices:

-1

0

Masters

1

2

Linear Algebra (MTH501)

Question: **37** (Marks: 1)

Attempted Questions: **37** Total Questions: **52**

Kernel of transformation $T: V \rightarrow W$ is the set of those elements

Choices:

in V which maps onto the zero vector in W

Masters

in W which maps onto the zero vector in V

in V which maps onto W

in W which maps onto V

Linear Algebra (MTH501)

Question: 35 (Marks: 1)

Attempted Questions: 35 Total Questions: 52

If T is a linear transformation for all vectors \vec{u} and \vec{v} in the domain of T and, all scalars c and d then which of the following is true for T ?

Choices:

$$T(0)=0$$

$$T(c\vec{u} + d\vec{v})=cT(\vec{u})+dT(\vec{v})$$

$$T(c_1 v_1 + \dots + c_p v_p) = c_1 T(v_1) + \dots + c_p T(v_p)$$

All of the above.

Masters

Linear Algebra (MTH501)

Question: 29 (Marks: 1)

Attempted Questions: 28 Total Questions: 52

Let $v = (0, 2, 2, 1)$. The unit vector in the same direction as v is

Choices:

$$\left(0, \frac{2}{3}, \frac{2}{3}, \frac{-1}{3}\right)$$

$$\left(0, \frac{-2}{3}, \frac{2}{3}, \frac{-1}{3}\right)$$

$$\left(0, \frac{2}{3}, \frac{2}{3}, \frac{1}{3}\right)$$

Masters

$$\left(0, \frac{-2}{3}, \frac{2}{3}, \frac{1}{3}\right)$$

Linear Algebra (MTH501)

Question: **40** (Marks: 1)

Attempted Questions: **40** Total Questions: **52**

The LU -decomposition of a square matrix is _____.

Choices:

unique.

not unique.

Masters

Linear Algebra (MTH501)

Question: **38** (Marks: 1)Attempted Questions: **38** Total Questions: **52**

Let A and B be the square matrices such that $AB = I$. Then A and B are invertible with

Choices:

$$A^{-1} = B^{-1}$$

$$A = A^{-1} \text{ and } B = B^{-1}$$

$$B = A^{-1} \text{ and } A = B^{-1}$$

Masters

$$A = B$$

Linear Algebra (MTH501)

Question: 39 (Marks: 1)

Attempted Questions: 39 Total Questions: 52

If a system of equations is solved using the Jacobi's method, then which of the following is true about the diagonal matrix M ?

Choices:

All of its entries below the diagonal must be zero .

All of its entries above the diagonal must be zero .

All of these.

Masters

It is a non-singular matrix .

Linear Algebra (MTH501)

Question: **18** (Marks: 1)

Attempted Questions: **18** Total Questions: **52**

If the set $V = \{0, 1, 2, 3\}$, then which of the following is true for it ?

Choices:

It is closed under operation of addition .

It is a vector space .

It is commutative under operation of addition .

It has an additive inverse of each element .

Masters

Linear Algebra (MTH501)

Question: 21 (Marks: 1)

Attempted Questions: 21 Total Questions: 52

$$A = \begin{bmatrix} 1 & 3 & 2 & -1 & 5 \\ 2 & 2 & 1 & 1 & 4 \\ -1 & 4 & 1 & 2 & -3 \\ 3 & 5 & 3 & -4 & 2 \end{bmatrix}$$

Let W , the row space of A is the subspace of R^5 . Identify the set by which the row space of A is spanned?

Choices:

$$\{(1, 2, -1, 3), (3, 2, 4, 5), (2, 1, 1, 3), (-1, 1, 2, -4), (5, 4, -3, 2)\}$$

$$\{(1, 2, -1, 3), (2, 4, -2, 6), (2, 1, 1, 3), (-1, 1, 2, -4), (6, 3, 3, 9)\}$$

$$\{(1, 3, 2, -1, 5), (2, 6, 4, -2, 10), (-1, 4, 1, 2, -3), (-3, 12, 3, 6, -9)\}$$

$$\{(1, 3, 2, -1, 5), (2, 2, 1, 1, 4), (-1, 4, 1, 2, -3), (3, 5, 3, -4, 2)\}$$

Masters

Linear Algebra (MTH501)

Question: 22 (Marks: 1)

Attempted Questions: 22 Total Questions: 52

If the Casorati matrix is not invertible, then which of the following is the most appropriate option regarding the associated signals ?

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Choices:

The signals are linearly independent .

The signals are linearly dependent .

The signals may or may not dependent .

Masters

The signals may or may not independent .