

MTH501 Paper Midterm 2010 - Linear Algebra - s4

MTH501 – Linear Algebra – Midterm Paper 2010

Examination - Spring 2010 - (Session - 4)

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Time: 60 min

Marks = M = 40

MTH501 - Linear Algebra - Q. No. 1 (M - 1)

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

- ▶ one-to-one
- ▶ onto

MTH501 - Linear Algebra - Q. No. 2 (M - 1)

Which one of the following is an elementary matrix?

- ▶ $\begin{bmatrix} 1 & 0 \\ 0 & -3 \end{bmatrix}$
- ▶ $\begin{bmatrix} 1 & 0 & 1 \\ 0 & -3 & -3 \end{bmatrix}$
- ▶ $\begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix}$
- ▶ $\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$

MTH501 - Linear Algebra - Q. No. 3 (M - 1)

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

- ▶ $\det kA = k \det A$
- ▶ $\det kA = \det (k+A)$
- ▶ $\det k A = k^2 \det A$
- ▶ $\det kA = \det A$

MTH501 - Linear Algebra - Q. No. 4 (M - 1)

The equation $x = p + t v$ describes a line

- ▶ through v parallel to p
- ▶ through p parallel to v
- ▶ through origin parallel to p

MTH501 - Linear Algebra - Q. No. 5 (M - 1)

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

▶ $v_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, v_2 = \begin{bmatrix} 6 \\ 2 \end{bmatrix}$

▶ $v_1 = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}, v_2 = \begin{bmatrix} 6 \\ 2 \\ 1 \end{bmatrix}$

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▶ $v_1 = \begin{bmatrix} 5 \\ 2 \\ 3 \end{bmatrix}, v_2 = \begin{bmatrix} 10 \\ 4 \\ 6 \end{bmatrix}$

MTH501 - Linear Algebra - Q. No. 6 (M - 1)

Every linear transformation is a matrix transformation

- ▶ True
- ▶ False

MTH501 - Linear Algebra - Q. No. 7 (M - 1)

A null space is a vector space.

- ▶ True
- ▶ False

MTH501 - Linear Algebra - Q. No. 8 (M - 1)

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

- ▶ equals to the old determinant
- ▶ equals to -1 times the old determinant

MTH501 - Linear Algebra - Q. No. 9 (M - 1)

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
- ▶ 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

<http://www.vuzs.info/study-portals/bscs-study-portal.html>

MTH501 - Linear Algebra - Q. No. 10 (M - 1)

If A is invertible, then $\det(A)\det(A^{-1})=1$. (<http://www.vuzs.info/study-portals/bscs-study-portal.html>)

- ▶ True
- ▶ False

MTH501 - Linear Algebra - Q. No. 11 (M - 1)

A square matrix $A = [a_{ij}]$ is lower triangular if and only if $a_{ij} = 0$ for

- ▶ $i > j$
- ▶ $i < j$
- ▶ $i \leq j$
- ▶ $i = j$

MTH501 - Linear Algebra - Q. No. 12 (M - 1)

The product of upper triangular matrices is

- ▶ lower triangular matrix
- ▶ upper triangular matrix
- ▶ diagonal matrix

MTH501 - Linear Algebra - Q. No. 13 (M - 1)

The matrix multiplication is associative

- ▶ True
- ▶ False

MTH501 - Linear Algebra - Q. No. 14 (M - 1)

We can add the matrices of _____.

- ▶ same order
- ▶ same number of columns.
- ▶ same number of rows
- ▶ different order

MTH501 - Linear Algebra - Q. No. 15 (M - 1)

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

- ▶ repeat
- ▶ large difference
- ▶ different

MTH501 - Linear Algebra - Q. No. 16 (M - 1)

Jacobi's Method is _____ converges to solution than Gauss Siedal Method.

- ▶ slow
- ▶ fast
- ▶ better

MTH501 - Linear Algebra - Q. No. 17 (M - 1)

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

- ▶ $AX = B$
- ▶ $AX = 0$
- ▶ $AB = X$
- ▶ $X = A^{-1}$

MTH501 - Linear Algebra - Q. No. 18 (M - 1)

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

- ▶ True
- ▶ False

MTH501 - Linear Algebra - Q. No. 19 (M - 1)

Whenever a system has no free variable, the solution set contains many solutions. (<http://www.vuzs.info/study-portals/bscs-study-portal.html>)

- True
- False

MTH501 - Linear Algebra - Q. No. 20 (M - 1)

Which of the following is not a linear equation?

- $x_1 + 4x_2 + 1 = x_3$
- $x_1 = 1$
- $x_1 + 4x_2 - (\text{square root of } 2)x_3 + (\text{square root of } 4)$
- $x_1 + 4x_1x_2 - (\text{square root of } 2)x_3 = (\text{square root of } 4)$

MTH501 - Linear Algebra - Q. No. 21 (M - 2)

If a square idempotent matrix A is non singular then show that A is equal to the identity matrix I.

MTH501 - Linear Algebra - Q. No. 22 (M - 2)

Let $v_1 = \begin{bmatrix} 7 \\ 4 \\ -9 \\ -5 \end{bmatrix}, v_2 = \begin{bmatrix} 4 \\ -7 \\ 2 \\ 5 \end{bmatrix}, v_3 = \begin{bmatrix} 1 \\ -5 \\ 3 \\ 4 \end{bmatrix}$

, and $H = \text{span} \{ v_1, v_2, v_3 \}$. It can be verified that $v_1 - 3v_2 + 5v_3 = 0$

Use this information to find a basis for H.

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MTH501 - Linear Algebra - Q. No. 23 (M - 3)

Find $\begin{vmatrix} 1 & 2 & 3 \\ -4 & 5 & 6 \\ 7 & -8 & 9 \end{vmatrix}$

(<http://www.vuzs.info/study-portals/bscs-study-portal.html>)

MTH501 - Linear Algebra - Q. No. 24 (M - 3)

Determine bases for the plane $3x - 2y + 5z = 0$ as a subspace of \mathbb{R}^3

MTH501 - Linear Algebra - Q. No. 25 (M - 5)

Show that $\begin{bmatrix} I & 0 \\ A & I \end{bmatrix}$ is invertible and find its inverse.

MTH501 - Linear Algebra - Q. No. 26 (M - 5)

Find the condition for r and s such that the vectors $(r, 2, s)$, $(r+1, 2, 1)$ and $(3, s, 1)$ are linear dependent.