MTH501

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 matrix?

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

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

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

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

Question No: 3

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

Question No:

The equation x = p + t v describes a line

► through v parallel to p

► **through p parallel to v**

► through origin parallel to p

Question No: 5

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

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

►

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

►

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

►

Question No: 6

Every linear transformation is a matrix transformation

► **True**

► False

Question No: 7

A null space is a vector space.

► True
► False

Question No: 8

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

► equals to the old determinant

► equals to -1 times the old determinant

Question 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

► 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

If A is invertible, then $\det(A)\det(A^{-1})=1$.

► True

► False

Question No: 11

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

► $i > j$
► $i < j$
► $i \leq j$
► $i = j$

Question No: 12

The product of upper triangular matrices is

► lower triangular matrix

► upper triangular matrix
► diagonal matrix

Question No: 13

The matrix multiplication is associative
► True
► False

Question No: 14

We can add the matrices of _______________.
► same order
► same number of columns.
► same number of rows
► 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
- ► large difference
- ► different
- **► Same**

Question No: 16

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

- ► slow
- **► fast**
- ► better

Question No: 17

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

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

Question No: 18

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

- ► True
- **► False**

Question No: 19

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

► True
► **False**

Question No: 20

Which of the following is not a linear equation?

► $x_1 + 4x_2 + 1 = x_3$
► $x_1 = 1$
► $x_1 + 4x_2 - \sqrt{2}x_3 = \sqrt{4}$
► $x_1 + 4x_1x_2 - \sqrt{2}x_3 = \sqrt{4}$

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 ?
Select correct option:

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:

➢ **TRUE**
➢ FALSE

Question No: 23

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

- FALSE
- **TRUE**

Question No: 24

A matrix A and its transpose have the same determinant.

- **TRUE**
- FALSE

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?

- No solution
- **Unique solution**
- Different solutions
- Infinitely many solutions

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.

- TRUE
- **FALSE**

Question No: 27

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

- 2
- 4

- 6
- **8**

Question No: 28

If A is n x n matrix and det (A) = 2 then det (5A) = ________.

- **10**
- 32
- 5
- 8

Question No: 29

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

- multiplication of vectors
- addition of vectors
- subspace {0}
- **scalar multiplication of vectors**

Question No: 30

If one row of A is multiplied by k to produce B, then which of the following condition is true?

Select correct option:

- det(AB) = (detA)(detB)
- **detB = k detA**
- detB = – detA
- detB = detA

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

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

> one-to-one
> onto

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

Which one of the following is an elementary matrix?

0 –3

0 –3 3

► 2 3

1 2

0 3

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

Let A- [ ] 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 det A
> det kA = detA

MTH501 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.

MTH501 - Linear Algebra - Q. No. 6 (M - 1)
Every linear transformation is a matrix transformation

> False
MTH501 - Linear Algebra - Q. No. 7
(M - A null space is a vector space.

> False
MTH501 - Linear Algebra - Q. No. 8(M -
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 Where r is

> the number of rows of A
> the number of row interchanges made during row reduction from A to
> the number of rows of U
> the number of row interchanges made during row reduction U to A

MTH501 - Linear Algebra - Q. No. 10 (M - 1)
If A is invertible, then det(A)det(A)=1.

> False

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

A square matrix A= [a] is lower triangular if and only if a= 0 for

- ▶ i > j
- ▶ i < j
- ▶ i ≤ 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 -

The matrix multiplication is associative

> False

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

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 -

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)

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.

> False

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

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

.

> False

MTH501 Algebra - Q. No. 20 (M) Which of the following is not a linear equation?

- ▶ $x_1 + 4x_2 + 1 = x_3$
- ▶ $x_1 = 1$

> x + 4x — (square root of) 2 x+ (square root of) 4

> x + 4 xx — (square root of) 2 x = (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 l.

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 = span { VI : V3}.lt can be verified that - 3V2 +5
"'3=0 Use this information to find a basis for H.

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

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

MTH501 - Linear Algebra - Q. No. 24 (M - 3) Determine bases for the plane 3x — 2y + 5z = 0 as a subspace of R_3

MTH501 - Linear Algebra - Q. No. 25 (M - 5)
Show that [ ] 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.

Mth 501 mid term paper

Question No: 1 (Marks: 1) - Please choose one

If A is a 2×2 matrix, the area of the parallelogram determined by the columns of A is

- ► A^{-1}
- ► det A
- ► adj A

Question No: 2 (Marks: 1) - Please choose one

Cramer's rule leads easily to a general formula for

- ► the inverse of an $n\times n$ matrix A
- ► the adjugate of an $n\times n$ matrix A
- ► the determinant of an $n\times n$ matrix A

Question No: 3 (Marks: 1) - Please choose one

The transpose of an upper triangular matrix is

- ► lower triangular matrix
- ► upper triangular matrix
- ► diagonal matrix

Question No: 4 (Marks: 1) - Please choose one

Let A be a square matrix of order 3×3 with $\det(A)=21$, then $\det(2A)=$

- ► 168
- ► 186
- ► 21
- ► 126

Question No: 5 (Marks: 1) - Please choose one

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

- ► True
- ► False

Question No: 6 (Marks: 1) - Please choose one

Col A is all of $\mathbb{R}^m$ if and only if

► the equation $Ax = 0$ has a solution for each b in $\mathbb{R}^m$

► the equation $Ax = b$ has a solution for each b in $\mathbb{R}^m$

► the equation $Ax = b$ has a solution for a fixed b in $\mathbb{R}^m$.

Question No: 7 (Marks: 1) - Please choose one

$$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \qquad B = \begin{bmatrix} B_1 \\ B_2 \end{bmatrix}$$

If and , then the partitions of A and B

► are not conformable for block multiplication

► are conformable for AB block multiplication

► are not conformable for BA block multiplication

Question No: 8 (Marks: 1) - Please choose one

Two vectors are linearly dependent if and only if they lie

► on a line parallel to x-axis

► on a line through origin

► on a line parallel to y-axis

Question No: 9 (Marks: 1) - Please choose one

The equation x = p + t v describes a line

► through v parallel to p

► through p parallel to v

► through origin parallel to p

Question No: 10 (Marks: 1) - Please choose one

Let A be an $m \times n$ matrix. If for each b in $\mathbb{R}^m$ the equation Ax=b has a solution then

► A has pivot position in only one row

► Columns of A span $\mathbb{R}^m$

► Rows of A span $\mathbb{R}^m$

Question No: 11 (Marks: 1) - Please choose one

$$\begin{aligned} x_1 - 2x_2 + \quad x_3 &= 8 \\ 2x_2 - 7x_3 &= \quad 0 \\ -4x_1 + 3x_2 + 9x_3 &= -6 \end{aligned}$$

Given the system the augmented matrix for the system is

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

►

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

►

$$\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -8 \\ -4 & 5 & 9 \end{bmatrix}$$

►

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

►

Question No: 12 (Marks: 1) - Please choose one

Consider the linear transformation T such that $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is the matrix of linear transformation then $T\begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$ is

$\begin{bmatrix} 10 \\ 4 \\ 2 \end{bmatrix}$

► $\begin{bmatrix} 1 \\ 0 \\ 9 \end{bmatrix}$

► $\begin{bmatrix} 10 \\ 4 \\ 1 \end{bmatrix}$

► $\begin{bmatrix} 1 \\ 2 \\ 3 \\ 2 \end{bmatrix}$

►

Question No: 13 (Marks: 1) - Please choose one

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

► 15
► 45

► 135
► 60

Question No: 14 (Marks: 1) - Please choose one

For an n×n matrix $(A^t)^t$ =

► A^t

► A

► A^{-1}

► $(A^{-1})^{-1}$

Question No: 15 (Marks: 1) - Please choose one

Each Linear Transformation T from R^n to R^m is equivalent to multiplication by a matrix A of order

► m´n

► n´m

► n´n

► m´m

Question No: 16 (Marks: 1) - Please choose one

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

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

► $\begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \end{bmatrix}$

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

►

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

▶

Question No: 17 (Marks: 2)

Find vector and parametric equations of the plane that passes through the origin of $\boldsymbol{R}^3$ and is parallel to the vectors $\boldsymbol{v_1} = (1, 2, 5)$ and $\boldsymbol{v_2} = (5, 0, 4)$.

Question No: 18 (Marks: 2)

Which of the following is true? If V is a vector space over the field F.(justify your answer)

(a) $\{x+y / x \in V, y \in V\} = V$

(b) $\{x+y / x \in V, y \in V\} = V \times V$

(c) $\{\lambda v / v \in V, \lambda \in F\} = F \times V$

Question No: 19 (Marks: 3)

Let $v_1 = \begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix}, v_2 = \begin{bmatrix} -2 \\ 1 \\ 7 \end{bmatrix}, and\ y = \begin{bmatrix} h \\ -3 \\ -5 \end{bmatrix}.$ For what value(s) of h is $\boldsymbol{y}$ in the plane generated by $\boldsymbol{v_1}$ and $\boldsymbol{v_2}$?

Question No: 20 (Marks: 5)

With T defined by T(x)= Ax , find a vector x whose image under T is b, and determine whether x is unique.

$$\begin{bmatrix} 1 & -5 & -7 \\ -3 & 7 & 5 \end{bmatrix}, b = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$$

Question No: 21 (Marks: 10)

Given A and b , write the augmented matrix for the linear system that corresponds to the matrix equation $Ax = b$ .Then solve the system and write the solution as a vector.

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

MTH501

Question No: 1 (Marks: 1) - Please choose one

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 (Marks: 1) - Please choose one Which one of the following is an elementary matrix?

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

Question No: 3 (Marks: 1) - Please choose one

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 A = k.det A

Question No: 4 (Marks: 1) - Please choose one

The equation x = p + t v describes a line

► through v parallel to p
► **through p parallel to v**
► through origin parallel to p

Question No: 5 (Marks: 1) - Please choose one

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

► v_1 1 2 , 6 v_2 2

► v_1 3 2 , 1 6 v_2 2 1

□ □5 □

www v_1 □□ □□ □10 v_2

□2 , □□ □□

► (lec 8) **hint* vector v1 is a multiple of v2**

□ □□ □4

□3

□ □□

□6

Question No: 6 (Marks: 1) - Please choose one

Every linear transformation is a matrix transformation

► True
► False

Question No: 7 (Marks: 1) - Please choose one

A null space is a vector space.

► **True**
► False

Question No: 8 (Marks: 1) - Please choose one

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

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

Question No: 9 (Marks: 1) - Please choose one

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

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If A is invertible, then $\det(A)\det(A^{-1})=1$.

► True

► False

Question No: 11 (Marks: 1) - Please choose one

A square matrix A a□□□ $_{ij}$ □□ is lower triangular if and only if a_{ij} □0 for

► i □ j

► i □ j

► i □ j

► i □ j

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The product of upper triangular matrices is

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► **True**
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We can add the matrices of _______________.

► **same order**
► same number of columns.

- ► same number of rows
- ► different order

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

- ► **repeat(same)**
- ► large difference
- ► different

Question No: 16 (Marks: 1) - Please choose one

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

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- ► fast
- ► better

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

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

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

- ► True
- ► **False**

Question No: 19 (Marks: 1) - Please choose one

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

► True

► **False**

Question No: 20 (Marks: 1) - Please choose one

Which of the following is not a linear equation?

▶ $x_1 \square 4x_2 \square \square 1\ x_3$

▶ $x_1 \square 1$

▶ $x_1 \square\square 4x_2 \quad \sqrt{2}x_3 \square \sqrt{4}$

▶ $x_1 \square 4x_1x_2 \square \sqrt{2}x_3 \square \sqrt{4}$

Question No: 21 (Marks: 1) - Please choose one

If A is a $2\ 2\square$ matrix, the area of the parallelogram determined by the columns of A is

▶ det A
▶ adj A

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Cramer's rule leads easily to a general formula for

▶ the inverse of n x n matrix A
▶ the adjugate of an matrix A
▶ the determinant of an matrix A

Question No: 23 (Marks: 1) - Please choose one

The transpose of a lower triangular matrix is

▶ Lower triangular matrix
▶ Upper triangular matrix
▶ Diagonal matrix

Question No: 24 (Marks: 1) - Please choose one

The transpose of an upper triangular matrix is

▶ Lower triangular matrix
▶ Upper triangular matrix

► Diagonal matrix

Question No: 25 (Marks: 1) - Please choose one

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

► 168
► 186
► 21
► 126

Question No: 26 (Marks: 1) - Please choose one

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

► True
► False

Question No: 27 (Marks: 1) - Please choose one

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

Question No: 28 (Marks: 1) - Please choose one

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 (Marks: 1) - Please choose one
The determinant of a triangular matrix is the sum of the entries of the main diagonal.

- **True**
- **False**

Question No:30 (Marks: 1) - Please choose one If A^T is not invertible, then A is not invertible.

- **True**
- **False**

Question No: 31 (Marks: 1) - Please choose one

Col A is all of $\mathbb{R}^m$ if and only if

- the equation $Ax = 0$ has a solution for each b in $\mathbb{R}^m$
- the equation $Ax = b$ has a solution for each b in $\mathbb{R}^m$
- the equation $Ax = b$ has a solution for a fixed b in $\mathbb{R}^m$.

Question No: 32 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}$ and $B = \begin{bmatrix} B_1 \\ B_2 \end{bmatrix}$, then the partitions of A and B

- are not conformable for block multiplication
- are conformable for AB block multiplication
- are not conformable for BA block multiplication

Question No: 33 (Marks: 1) - Please choose one

Two vectors are linearly dependent if and only if they lie

- on a line parallel to x-axis
- on the same line through origin
- on a line parallel to y-axis

Question No: 34 (Marks: 1) - Please choose one

$$x_1 \square 2x_2 \square x_3 \square 8$$
$$2x_2 \square 7x_3 \square 0$$

4x_1 3x_2 9x_3 6

Given the system the augmented matrix for the system is

1 2 1

0 2 7

4 3 9

►

1 2 1 0

0 2 7 8

4 3 9 6

►

1 2 1

0 2 8

4 5 9

►

1 2 1 8

0 2 7 0

3 9

4 6

►

Question No: 35 (Marks: 1) - Please choose one

---

1 2 0

Consider the linear transformation T such that

□0 1 0□
□ □
□□1 0 0□□

is the matrix of linear transformation

□ □2
□ □4
□ □

then T □ □□ □6 is

▶ **□ □10 □ □4 □ □ □ □□ □2** □ □1 □ □0 □ □ □ □□ □9

▶

□ □10
□ □4
□ □
□ □□ □1

▶

□ □1
□ □2
□ □
□ □3
□ □
□ □2

▶

Question No: 36 (Marks: 1) - Please choose one

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 b ca | b c d | e f□53d
3e 3f g | h ig | h i

- ► **15**
- ► 45
- ► 135
- ► 60

Question No: 37 (Marks: 1) - Please choose one

For an n×n matrix $(A^t)^t$ =

- ► A^t
- ► A
- ► A^{-1}
- ► $(A^{-1})^{-1}$

Question No: 38 (Marks: 1) - Please choose one

Each Linear Transformation T from R^n to R^m is equivalent to multiplication by a matrix A of order

- ► m´n ☹
- ► n´m
- ► n´n
- ► m´m

Question No: 39 (Marks: 1) - Please choose one

Reduced echelon form of the matrix

1 2 3
2 3 4

is

1 2 3
0 0 1

▶
1 0 3
0 0 1

▶
1 0 0 1
0 1 2

▶
1 0 0 1
0 1 0

▶

Question No: 40 (Marks: 1) - Please choose one

How many subspaces R2 have?

- ➢ **only two: {0} and R2**
- ➢ Only four: {0} x- axis and y -axis and R ➢ Infinitely many.
- ➢ None of the above.

Question No: 41 (Marks: 1) - Please choose one

Which statement about the set S is false where S = {(1, 1, 3), (2, 3, 7),(2, 2, 6)}

- ➢ The set S contain an element which is solution of the equation 5x – y- ➢ **The Set S is linearly independent.**
- ➢ The set S contain two elements which are multiple of each other. ➢ The Set S is linearly dependent.

Question No: 42 (Marks: 1) - Please choose one

Basis is a spanning set that is as small as possible.

- **True**
- False

Question No: 43 (Marks: 1) - Please choose one

For any 3x3 matrix A where det (A) = 3, then det (2A) = ________.

24
20
15
6

Question No: 44 (Marks: 1) - Please choose one

Which of the following is the coefficient matrix? x_1

□2x_2□ x_3□ 0

□2x_2□7x_3□ 8

□4x_1□3x_2□9x_3□□6 for

the system?

- Parallel and distinct
- Intersecting (one solution)
- Coincident
- Perpendicular

Question No: 45 (Marks: 1) - Please choose one

If a system of linear equations is inconsistent then it has ______

- Infinite solutions
- Finite solutions
- Unique solution
- **No solution**

Question No: 46 (Marks: 1) - Please choose one

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

- …
- …
- …
- …

Question No: 47 (Marks: 1) - Please choose one

Which of the following is true for the matrix?

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

- It is an identity matrix
- It is in reduced echelon form
- **It is in echelon form**
- It is a rectangular matrix

Question No: 48 (Marks: 1) - Please choose one

Which of the following is the simplified form of -1
[-1 2] + [2 3]?

- …
- …
- …
- …

Question No: 49 (Marks: 1) - Please choose one

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

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

Question No: 50 (Marks: 1) - Please choose one

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
- **0**
- 1
- 2

Question No: 51 (Marks: 1) - Please choose one

$\vec{v}_1$ □(2,1), $\vec{v}_2$ □(3,4) *and* $\vec{v}_3$ □(7,8) Which of the following is true?

- $\{v_1,v_2,v_3\}$ is linearly dependent
- **$\{v_1,v_2,v_3\}$ is linearly independent** (set of vectors does not contain zero vector) □ The vector equation has trivial solution
- $\vec{v}_1$ □ $\frac{2}{3}\vec{v}_2$

Question No: 52 (Marks: 1) - Please choose one

Since every linear transformation $T\ R$: ^{n} □ R^m is actually a matrix transformation, then which of the following is the alternate notation for the transformation?

- $A\vec{x}$ □ x
- $A\vec{x}$ □ $T\ x(\ )$ □ $\vec{x}$ □ Ax
- $T\ \vec{x}(\ )$ □ $A\vec{x}$

Question No: 53 (Marks: 1) - Please choose one

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

- $T\ cu\vec{d}v($.) □ $cT\ u\ dT\ v(\ ).(\ )$ where ‘c’ and ‘d’ are scalars
- $T\ c\vec{u}\ d\vec{v}($ □ $)$ □ $cT\ u\ dT\ \vec{v}(\ )$□ $(\ )$ **where ‘c’ and ‘d’ are scalars** **lec 9-> exmple 7->**

  property 2
- $T\ cuxd\vec{v}($) □ $\vec{c}T\ u\ xd\vec{T}\ v(\ )$ ( ) where ‘c’ and ‘d’ are scalars
- $T\ cu\ \vec{d}v($ □ $)$ □ $dT\ u\ cT\ v(\ )$□ $(\ )$ where ‘c’ and ‘d’ are scalars

Question No: 54 (Marks: 1) - Please choose one

If A □□□2413□□□ and B □□□21 1□□242□□11□□□ , then which of the following is true for A and B?

- **A and B are equal matrices**
- A is the transpose of B
- B is the transpose of A
- B is the multiplicative inverse of A

Question No: 55 (Marks: 1) - Please choose one

Which of the following id true for the matrix

A □□□1 00 □5□□□ ?

□

- Identity matrix
- **Elementary matrix**
- Rectangular matrix
- Singular matrix

Question No: 56 (Marks: 1) - Please choose one

□ 1 2 0 0 0 0 □

□□1 3 0 0 0 0 □

□ □

□ 0 0 2 1 0 0 □

A □ □□ 0 0 3 5 0 0 □□

□ 0 0 0 0 3 □2□

□ □

□ 0 0 0 0 2 1 □

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

- **Block diagonal matrix**
- Block upper triangular matrix
- Diagonal-constant matrix
- Partitioning is not possible in the matrix A

Question No: 57 (Marks: 1) - Please choose one

If A is a matrix of order m x n, then which of the following is true for LU factorization of A?

- **The order of L is m x m and the order of U is m x n**
- The order of L is m x p and the order of U is p x n
- The order of both L and U is m x m
- The order of both L and U is m x n

Question No: 58 (Marks: 1) - Please choose one

If $A\vec{x}$ $\vec{b}$ □ and factorization of A is LU, then Which of the following pair of equations can be used to solve $LU\vec{x}$ $\vec{b}$ □ for the value of '*x*'?

- □ [redacted] *x yandLy b* □ □
- □ [redacted] *x yandUy b* □ □
- □ [redacted] *b yandLy x* □ □
- [redacted] • *Lb yandUy x* □ □

Question No:59 (Marks: 1) - Please choose one

If a system of equations is solved using the Jacobl's method, then which of the following is NOT true about the matrix M that is derived from the coefficient matrix?

- All of its entries below the diagonal must be zero
- All of its entries above the diagonal must be zero
- It may or may not be invertible
- It is a non-singular matrix

Question No: 60 (Marks: 1) - Please choose one

□*a b*□

If *A* □□*c d*□□, then which of the following is □

- ad+bc
- **ad-bc**
- bc+ad
- bc-ad

Question No: 61 (Marks: 1) - Please choose one

□1 0 0□

If *A* □ □2 4 0□ then which of the following is the value of det(A)?

3 5 6

- 3
- 10
- 12
- **24**

Question No: 62 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 0 & 0 & 1 \\ 1 & -k & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then which of the following is the value of det(A)?

- **k**
- k-1
- 1
- k+1

Question No: 63 (Marks: 1) - Please choose one

Let $A = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 4 & 3 & 1 & 2 \\ 1 & 2 & 5 & 3 \end{bmatrix}$ and the null space of A is a subspace of E^k , then which of the following is value of k?

- 1
- 2
- 3
- 4

Last 20 mcqs are from current paper of 2013

good luck

libriasnmine

MTH 501

Q: 21: If A=B, then determine the Value of x and y, Where $A =$ 1X + 2Y3+ 2 and $B =$ 14 32 .

MARKS: 2:

Q: 22: Let $A = 2\ 3\ 4\ 5$ 3 , Solutions of

$x_1 = x_3 + 2x_4$ $x_2 = -2x_3 - 3x_4$ x_3 = *free of* variable

x_4 = *free of* variable

MARKS: 2:

Q: 23: Determine the matrix is block upper triangular, Block lower triangular or Block diagonal.

1 0 0 0

$B =$ 22 13 24 00 .

3 2 0 9

MARKS: 5:

MTH501- Linear Algebra
MCQS MIDTERM EXAMINATION
~"LIBRIANSMINE"~

Question No: 1 (Marks: 1) - Please choose one

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 (Marks: 1) - Please choose one

Which one of the following is an elementary matrix?

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

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

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

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

Question No: 3 (Marks: 1) - Please choose one

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 A = k.det A

Question No: 4 (Marks: 1) - Please choose one

The equation x = p + t v describes a line

► through v parallel to p

► through p parallel to v

► through origin parallel to p

Question No: 5 (Marks: 1) - Please choose one

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

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

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

► $v_1 = \begin{bmatrix} 5 \\ 2 \\ 3 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 10 \\ 4 \\ 6 \end{bmatrix}$ **(lec 8) hint* vector v1 is a multiple of v2**

Question No: 6 (Marks: 1) - Please choose one

Every linear transformation is a matrix transformation

► True

► False

Question No: 7 (Marks: 1) - Please choose one

A null space is a vector space.

► **True**
► False

Question No: 8 (Marks: 1) - Please choose one

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

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

Question No: 9 (Marks: 1) - Please choose one

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

Question No: 10 (Marks: 1) - Please choose one

If A is invertible, then $\det(A)\det(A^{-1})=1$.

► True
► False

Question No: 11 (Marks: 1) - Please choose one

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

► $i > j$

► $i < j$

► $i \leq j$

► $i = j$

Question No: 12 (Marks: 1) - Please choose one

The product of upper triangular matrices is

- ► lower triangular matrix
- ► upper triangular matrix
- ► diagonal matrix

Question No: 13 (Marks: 1) - Please choose one

The matrix multiplication is associative

- ► **True**
- ► False

Question No: 14 (Marks: 1) - Please choose one

We can add the matrices of _______________.

- ► **same order**
- ► same number of columns.
- ► same number of rows
- ► different order

Question No: 15 (Marks: 1) - Please choose one

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

- ► **repeat(same)**
- ► large difference
- ► different

Question No: 16 (Marks: 1) - Please choose one

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

- ► slow
- ► fast
- ► better

Question No: 17 (Marks: 1) - Please choose one

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

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

Question No: 18 (Marks: 1) - Please choose one
The row reduction algorithm applies only to augmented matrices for a linear system.

- ▶ True
- ▶ **False**

Question No: 19 (Marks: 1) - Please choose one
Whenever a system has no free variable, the solution set contains many solutions.

- ▶ True
- ▶ **False**

Question No: 20 (Marks: 1) - Please choose one

Which of the following is not a linear equation?

- ▶ $x_1 + 4x_2 + 1 = x_3$
- ▶ $x_1 = 1$
- ▶ $x_1 + 4x_2 - \sqrt{2}x_3 = \sqrt{4}$
- ▶ $x_1 + 4x_1x_2 - \sqrt{2}x_3 = \sqrt{4}$

Question No: 21 (Marks: 1) - Please choose one

If A is a 2×2 matrix, the area of the parallelogram determined by the columns of A is

- ▶ **det A**
- ▶ adj A

Question No: 22 (Marks: 1) - Please choose one

Cramer's rule leads easily to a general formula for

- ► the inverse of n x n matrix A
- ► the adjugate of an matrix A
- ► the determinant of an matrix A

Question No: 23 (Marks: 1) - Please choose one

The transpose of a lower triangular matrix is

- ► Lower triangular matrix
- ► Upper triangular matrix
- ► Diagonal matrix

Question No: 24 (Marks: 1) - Please choose one

The transpose of an upper triangular matrix is

- ► Lower triangular matrix
- ► Upper triangular matrix
- ► Diagonal matrix

Question No: 25 (Marks: 1) - Please choose one

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

- ► 168
- ► 186
- ► 21
- ► 126

Question No: 26 (Marks: 1) - Please choose one

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

- ► True
- ► False

Question No: 27 (Marks: 1) - Please choose one

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

Question No: 28 (Marks: 1) - Please choose one

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 (Marks: 1) - Please choose one
The determinant of a triangular matrix is the sum of the entries of the main diagonal.

- ➢ **True**
- ➢ **False** product

Question No:30 (Marks: 1) - Please choose one
If A^T is not invertible, then A is not invertible.

- ➢ **True**
- ➢ **False**

Question No: 31 (Marks: 1) - Please choose one

Col A is all of $\mathbb{R}^m$ if and only if

- ► the equation $Ax = 0$ has a solution for each b in $\mathbb{R}^m$
- ► the equation $Ax = b$ has a solution for each b in $\mathbb{R}^m$
- ► the equation $Ax = b$ has a solution for a fixed b in $\mathbb{R}^m$.

Question No: 32 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}$ and $B = \begin{bmatrix} B_1 \\ B_2 \end{bmatrix}$, then the partitions of A and B

- ► are not conformable for block multiplication
- ► are conformable for AB block multiplication
- ► are not conformable for BA block multiplication

Question No: 33 (Marks: 1) - Please choose one

Two vectors are linearly dependent if and only if they lie

► on a line parallel to x-axis
► on the same line through origin
► on a line parallel to y-axis

Question No: 34 (Marks: 1) - Please choose one

Given the system

$$\begin{aligned} x_1 - 2x_2 + x_3 &= 8 \\ 2x_2 - 7x_3 &= 0 \\ -4x_1 + 3x_2 + 9x_3 &= -6 \end{aligned}$$

the augmented matrix for the system is

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

►

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

►

$$\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -8 \\ -4 & 5 & 9 \end{bmatrix}$$

►

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

►

Question No: 35 (Marks: 1) - Please choose one

Consider the linear transformation T such that $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is the matrix of linear transformation then $T\begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$ is

► $\begin{bmatrix} 10 \\ 4 \\ 2 \end{bmatrix}$

► $\begin{bmatrix} 1 \\ 0 \\ 9 \end{bmatrix}$

► $\begin{bmatrix} 10 \\ 4 \\ 1 \end{bmatrix}$

► $\begin{bmatrix} 1 \\ 2 \\ 3 \\ 2 \end{bmatrix}$

Question No: 36 (Marks: 1) - Please choose one

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 5 \qquad \begin{vmatrix} a & b & c \\ 3d & 3e & 3f \\ g & h & i \end{vmatrix}$$

If then will be

- ▶ **15**
- ▶ 45
- ▶ 135
- ▶ 60

Question No: 37 (Marks: 1) - Please choose one

For an n×n matrix $(A^t)^t$ =

- ▶ A^t
- ▶ A
- ▶ A^{-1}
- ▶ $(A^{-1})^{-1}$

Question No: 38 (Marks: 1) - Please choose one

Each Linear Transformation T from R^n to R^m is equivalent to multiplication by a matrix A of order

- ▶ m´n ☹
- ▶ n´m
- ▶ n´n
- ▶ m´m

Question No: 39 (Marks: 1) - Please choose one

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

Reduced echelon form of the matrix is

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

- ▶

$$\begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \end{bmatrix}$$

▶

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

▶

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

▶

Question No: 40 (Marks: 1) - Please choose one

How many subspaces R2 have?

- **only two: {0} and R2**
- Only four: {0} x- axis and y -axis and R
- Infinitely many.
- None of the above.

Question No: 41 (Marks: 1) - Please choose one

Which statement about the set S is false where S = {(1, 1, 3), (2, 3, 7),(2, 2, 6)}

- The set S contain an element which is solution of the equation 5x – y-
- **The Set S is linearly independent.**
- The set S contain two elements which are multiple of each other.
- The Set S is linearly dependent.

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Basis is a spanning set that is as small as possible.

- **True**
- False

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For any 3x3 matrix A where det (A) = 3, then det (2A) = ________.

24
20
15
6

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Which of the following is the coefficient matrix?

$$x_1 \quad -2x_2 + \ x_3 = 0$$
$$+2x_2 - 7x_3 = 8$$
$$-4x_1 + 3x_2 + 9x_3 = -6$$

for the system?

- Parallel and distinct
- Intersecting (one solution)
- Coincident
- Perpendicular

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If a system of linear equations is inconsistent then it has _______

- Infinite solutions
- Finite solutions
- Unique solution
- **No solution**

Question No: 46 (Marks: 1) - Please choose one

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

- …
- …
- …
- …

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Which of the following is true for the matrix?

$$\begin{pmatrix} 1 & 3 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix}?$$

- It is an identity matrix
- It is in reduced echelon form
- **It is in echelon form**
- It is a rectangular matrix

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Which of the following is the simplified form of
-1 [-1 2] + [2 3]?

- …
- …
- …
- …

Question No: 49 (Marks: 1) - Please choose one

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

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

Question No: 50 (Marks: 1) - Please choose one

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
- **0**
- 1
- 2

Question No: 51 (Marks: 1) - Please choose one

$\overrightarrow{v_1} = (2,1), \overrightarrow{v_2} = (3,4)$ *and* $\overrightarrow{v_3} = (7,8)$ Which of the following is true?

- $\{v_1,v_2,v_3\}$ is linearly dependent
- **$\{v_1,v_2,v_3\}$ is linearly independent** (set of vectors does not contain zero vector)
- The vector equation has trivial solution
- $\overrightarrow{v_1} = \frac{2}{3}\vec{v}_2$

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Since every linear transformation $T : R^n \to R^m$ is actually a matrix transformation, then which of the following is the alternate notation for the transformation?

- $A\vec{x} \to \vec{x}$
- $A\vec{x} \to T(\vec{x})$
- $\vec{x} \to A\vec{x}$
- $T(\vec{x}) \to A\vec{x}$

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

- $T(c\vec{u}.d\vec{v}) = cT(\vec{u}).dT(\vec{v})$ where 'c' and 'd' are scalars
- $T(c\vec{u} + d\vec{v}) = cT(\vec{u}) + dT(\vec{v})$ **where 'c' and 'd' are scalars** **lec 9-> exmple 7-> property 2**
- $T(c\vec{u} x d\vec{v}) = cT(\vec{u}) x dT(\vec{v})$ where 'c' and 'd' are scalars
- $T(c\vec{u} + d\vec{v}) = dT(\vec{u}) + cT(\vec{v})$ where 'c' and 'd' are scalars

Question No: 54 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1+1 & 2-1 \\ 2+2 & 4-1 \end{bmatrix}$, then which of the following is true for A and B?

- **A and B are equal matrices**
- A is the transpose of B
- B is the transpose of A
- B is the multiplicative inverse of A

Question No: 55 (Marks: 1) - Please choose one

Which of the following id true for the matrix
$A = \begin{bmatrix} 1 & 0 \\ 0 & -5 \end{bmatrix}$?

- Identity matrix
- **Elementary matrix**
- Rectangular matrix
- Singular matrix

Question No: 56 (Marks: 1) - Please choose one

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

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

- **Block diagonal matrix**
- Block upper triangular matrix
- Diagonal-constant matrix
- Partitioning is not possible in the matrix A

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If A is a matrix of order m x n, then which of the following is true for LU factorization of A?

- **The order of L is m x m and the order of U is m x n**
- The order of L is m x p and the order of U is p x n
- The order of both L and U is m x m
- The order of both L and U is m x n

Question No: 58 (Marks: 1) - Please choose one

If $A\vec{x} = \vec{b}$ and factorization of A is LU, then Which of the following pair of equations can be used to solve $LU\vec{x} = \vec{b}$ for the value of '$\vec{x}$'?

- $U\vec{x} = \vec{y} and L\vec{y} = \vec{b}$
- $L\vec{x} = \vec{y} and U\vec{y} = \vec{b}$
- $U\vec{b} = \vec{y} and L\vec{y} = \vec{x}$
- $L\vec{b} = \vec{y} and U\vec{y} = \vec{x}$

Question No:59 (Marks: 1) - Please choose one

If a system of equations is solved using the Jacobl's method, then which of the following is NOT true about the matrix M that is derived from the coefficient matrix?

- All of its entries below the diagonal must be zero
- All of its entries above the diagonal must be zero
- It may or may not be invertible

- It is a non-singular matrix

Question No: 60 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then which of the following is

- ad+bc
- **ad-bc**
- bc+ad
- bc-ad

Question No: 61 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 4 & 0 \\ 3 & 5 & 6 \end{bmatrix}$ then which of the following is the value of det(A)?

- 3
- 10
- 12
- **24**

Question No: 62 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 0 & 0 & 1 \\ 1 & -k & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then which of the following is the value of det(A)?

- **k**
- k-1
- 1
- k+1

Question No: 63 (Marks: 1) - Please choose one

Let $A = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 4 & 3 & 1 & 2 \\ 1 & 2 & 5 & 3 \end{bmatrix}$ and the null space of A is a subspace of E^k , then which of the following is value of k?

- 1
- 2
- 3
- 4

Last 20 mcqs are from current paper of 2013

good luck

libriasnmine

SOLVED MTH 501 CURRENT QUISES...DATE 6 JULY 2012... SOLVED BY MASOOM

Question # 1 of 10 (Start time: 08:24:19 PM) Total Marks: 1
Two vectors u and v are orthogonal to each other if ___________.
Select correct option:

u . v = 0
u . v = 1
u + v = 0
u - v = 0

Question # 2 of 10 (Start time: 08:25:33 PM) Total Marks: 1
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 of 10 (Start time: 08:27:06 PM) Total Marks: 1
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.
linearly dependent

Question # 4 of 10 (Start time: 08:28:38 PM) Total Marks: 1
An n x n matrix A is _______ if and only if A has n linearly independent vectors.
Select correct option:
diagonalizable
singular not sure
symmetric
scalar

Question # 7 of 10 (Start time: 08:31:46 PM) Total Marks: 1
Two vectors are _______ if at least one of the vector is a multiple of the other
Select correct option:

linearly independent Page no 89
linearly dependent

SOLVED MTH 501 CURRENT QUISES…DATE 6 JULY 2012… SOLVED BY MASOOM

Question # 8 of 10 (Start time: 08:32:49 PM) Total Marks: 1
An n x n matrix with n distinct eigen values is diagonalizable.
Select correct option:
TRUE **Page no 402**
FALSE

Question # 9 of 10 (Start time: 08:33:50 PM) Total Marks: 1
2x – 3y = –2 4x + y = 24 The above system has a ______ solution.
Select correct option:
inconsistant
many
unique
trivial

Question # 10 of 10 (Start time: 08:35:02 PM) Total Marks: 1
An n x n matrix A is ___ if and only if 0 is not an eigen value of A.
Select correct option:
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

MTH501 Linear Algebra

Mid Term Examination - November 2004

Time Allowed: 90 Minutes

Instructions

Please read the following instructions carefully before attempting any of the questions:

1. Attempt all questions. Marks are written adjacent to each question.
2. Do not ask any questions about the contents of this examination from anyone.
  a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
  b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.

****WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an `F` grade in this course.**

Total Marks: 45 **Total Questions: 11**

Question No. 1	**Marks : 1**

Consider the system of Linear equations

$$x_1 + 4x_2 - 5x_3 = 0$$
$$2x_1 - x_2 + 8x_3 = 9$$
$$x_1 + x_2 - 8x_3 = 2$$

Then determinant of the Matrix of Coefficients of the above system is

(a) 91
(b) 123
(c) 141
(d) **81**

Question No. 2	Marks : 2

Consider the matrix $A = \begin{bmatrix} 1 & 2 & x+y \\ 2 & 3 & 4 \\ 2 & 3 & x-y \end{bmatrix}$ *and* $B = \begin{bmatrix} 1 & -2 & x-5y \\ 2 & 1 & 1 \\ 0 & 2 & 3x \end{bmatrix}$ such that

$A + B = \begin{bmatrix} 2 & 0 & 20 \\ 4 & 4 & 5 \\ 2 & 5 & 12 \end{bmatrix}$ Then the values of x and y are

(a) x = - 2 and y = 4
(b) x = 2 and y = - 6
(c) x = 0 and y = 0
(d) x = 2 and y = -4

Question No. 3	Marks : 1

Which statement about the set S is false where S = {(1, 1, 3), (2, 3, 7),(2, 2, 6)}

(a) The set S contain an element which is solution of the equation 5x – y- z = 0
(b) The Set S is linearly independent.
(c) The set S contain two elements which are multiple of each other.
(d) The Set S is linearly dependent.

Question No. 4	Marks : 2

Consider a linear transformation T such that $T\begin{bmatrix} 1 \\ 5 \\ 3 \end{bmatrix} = \begin{bmatrix} 6 \\ 9 \end{bmatrix}$ Then $T\begin{bmatrix} 5 \\ 25 \\ 15 \end{bmatrix} =$

(a) $\begin{bmatrix} 9 \\ 18 \end{bmatrix}$

(b) $\begin{bmatrix} 1 \\ 0 \\ 5 \end{bmatrix}$

(c) $\begin{bmatrix} 30 \\ 45 \end{bmatrix}$

(d) $\begin{bmatrix} 12 \\ 9 \end{bmatrix}$

Question No. 5	Marks : 1

How many subspaces R^2 have?

(a) only two: {0} and R^2
(b) Only four: {0} x- axis and y -axis and R^2
(c) Infinitely many.
(d) None of the above.

Question No. 6	Marks : 8

An oil refinery produces low-sulfur and high-sulfur fuel. Each ton of low-sulfur requires 5 minutes in the blending plant and 4 minutes in the refining plant; each ton of high sulfur fuel requires 4 minutes in the blending plant and 2 minutes in the refining plant. If the blending plant is available for 3 hours and the refining plant is available for 2 hours, how many tons of each type of fuel should be manufactured so that the plants are fully utilized?

Solution:

The data given in the question can be formed into system of linear equations as

	Low-sulfur	High-sulfur
Blending plant	5	4
Refining Plant	4	2

As we are given in the question that we have blending plant and refining plant available for 3 and 2 hours respectively. Let x tons of low-sulfur and y tons of high sulfur be the amount should be manufactured so that plants are fully utilized. Then from the above data we must have the system,

$$5x + 4y = 180$$
$$4x + 2y = 120$$

Augmented matrix for the above system

$$\begin{bmatrix} 5 & 4 & 180 \\ 4 & 2 & 120 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 60 \\ 4 & 2 & 120 \end{bmatrix} by\ R_1 - R_2$$

$$\sim \begin{bmatrix} 1 & 2 & 60 \\ 0 & -6 & -120 \end{bmatrix}$$

is

So we have x + 2y = 60 and -6y = - 120, thus we have y= 20 tons and x = 20tons are the required manufactured tons of each low-sulfur and high-sulfur so that we can utilize both plants for the given time.

Question No. 7	Marks : 5

Consider the matrix $A = \begin{bmatrix} 3 & 1 & 2 \\ 4 & 1 & 1 \\ 7 & 0 & 2 \end{bmatrix}$ then find the entry $\mathbf{a_{33}}$ of the matrix $\mathbf{A^2}$ without calculating the matrix $\mathbf{A^2}$.

<u>Solution:</u>

$$\text{Re}\,quired\ \ entry\,a_{33}\ of\ A^2 = \begin{bmatrix} ----- & & \\ ----- & & \\ 7 & 0 & 2 \end{bmatrix}\begin{bmatrix} - & - & 2 \\ - & - & 1 \\ - & - & 2 \end{bmatrix} marks:3 = \begin{bmatrix} ----- \\ ----- \\ 14+0+4 \end{bmatrix} = \begin{bmatrix} ----- \\ ----- \\ 18 \end{bmatrix}$$

Question No. 8	Marks : 8

Find LU decomposition for the matrix $A = \begin{bmatrix} 3 & 1 & 2 \\ 4 & 1 & 1 \\ 7 & 0 & 2 \end{bmatrix}$.

<u>Solution:</u>

$$\begin{array}{cc} U & L \end{array}$$

$$\begin{bmatrix} 1 & \frac{1}{3} & \frac{2}{3} \\ 4 & 1 & 1 \\ 7 & 0 & 2 \end{bmatrix} multiplier \frac{1}{3} \begin{bmatrix} 3 & 0 & 0 \\ * & * & 0 \\ * & * & * \end{bmatrix}$$

$$\begin{bmatrix} 1 & \frac{1}{3} & \frac{2}{3} \\ 0 & -\frac{1}{3} & -\frac{5}{3} \\ 0 & -\frac{7}{3} & -\frac{8}{3} \end{bmatrix} R_2 - 4R_1, R_3 - 7R_1 \begin{bmatrix} 3 & 0 & 0 \\ 4 & * & 0 \\ 7 & * & * \end{bmatrix}$$

$$\begin{bmatrix} 1 & \frac{1}{3} & \frac{2}{3} \\ 0 & 1 & 5 \\ 0 & -\frac{7}{3} & -\frac{8}{3} \end{bmatrix} multiplier\ -3 \begin{bmatrix} 3 & 0 & 0 \\ 4 & -\frac{1}{3} & 0 \\ 7 & * & * \end{bmatrix}$$

$$\begin{bmatrix} 1 & \frac{1}{3} & \frac{2}{3} \\ 0 & 1 & 5 \\ 0 & 0 & 9 \end{bmatrix} R_2 + \frac{7}{3} R_2 \begin{bmatrix} 3 & 0 & 0 \\ 4 & -\frac{1}{3} & 0 \\ 7 & -\frac{7}{3} & * \end{bmatrix}$$

$$\begin{bmatrix} 1 & \frac{1}{3} & \frac{2}{3} \\ 0 & 1 & 5 \\ 0 & 0 & 1 \end{bmatrix} multiplier - \frac{1}{9} \begin{bmatrix} 3 & 0 & 0 \\ 4 & -\frac{1}{3} & 0 \\ 7 & -\frac{7}{3} & 9 \end{bmatrix} .$$

The required LU factorization is

$$L=\begin{bmatrix}3 & 0 & 0\\ 4 & -\frac{1}{3} & 0\\ 7 & -\frac{7}{3} & 9\end{bmatrix} U=\begin{bmatrix}1 & \frac{1}{3} & \frac{2}{3}\\ 0 & 1 & 5\\ 0 & 0 & 1\end{bmatrix}$$

Question No. 9 **Marks : 8**

Write $v=\begin{bmatrix}4\\ -9\\ 2\end{bmatrix}$ as linear combination of $u_1=\begin{bmatrix}1\\ 2\\ -1\end{bmatrix}, u_2=\begin{bmatrix}1\\ 4\\ 2\end{bmatrix}$ *and* $u_3=\begin{bmatrix}1\\ -3\\ 2\end{bmatrix}$. (That is you have to find out the constants such that $v = c_1u_1 + c_2u_2 + c_3u_3$)

Solution:

We will try to find out the constants such that we can write $v = c_1u_1 + c_2u_2 + c_3u_3$ and we get the augmented matrix of the system of linear equations correspond to that linear combination as

$$\begin{bmatrix}1 & 1 & 1 & 4\\ 2 & 4 & -3 & -9\\ -1 & 2 & 2 & 2\end{bmatrix}$$

And echelon form of that matrix is

$$\begin{bmatrix}1 & 1 & 1 & 4\\ 0 & 1 & 1 & 2\\ 0 & 0 & 1 & 3\end{bmatrix} \Rightarrow x_3=3, x_2=-1, x_1=2$$

Question No. 10 **Marks : 5**

Show that the mapping $M: R3 \rightarrow R^3$ defined by $M\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}=\begin{bmatrix}1 & 0 & 1\\ 0 & 1 & 1\\ 1 & 0 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$ is a linear transformation. Also write the matrix of that linear transformation.

Solution:

We will prove that the mapping satisfies the conditions,

(i) M(***u*** + ***v***) = M(***u***) + M(***v***) (ii) M(c***u***)

(i) $M\begin{bmatrix} a+d \\ b+e \\ c+f \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} a+d \\ b+e \\ c+f \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\left\{\begin{bmatrix} a \\ b \\ c \end{bmatrix} + \begin{bmatrix} d \\ e \\ f \end{bmatrix}\right\}$ Now as we know that matrices are distributed over addition that is if A, B and C are matrices then A (B + C) = AB + BC, so we can write,

$$M\begin{bmatrix} a+d \\ b+e \\ c+f \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\left\{\begin{bmatrix} a \\ b \\ c \end{bmatrix} + \begin{bmatrix} d \\ e \\ f \end{bmatrix}\right\} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} + \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} d \\ e \\ f \end{bmatrix}$$

also by definition we have $M\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} a \\ b \\ c \end{bmatrix} \text{ and } M\begin{bmatrix} d \\ e \\ f \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} d \\ e \\ f \end{bmatrix}$. Hence we have,

$$M\begin{bmatrix} a+d \\ b+e \\ c+f \end{bmatrix} = M\begin{bmatrix} a \\ b \\ c \end{bmatrix} + M\begin{bmatrix} d \\ e \\ f \end{bmatrix}.$$

$$M\begin{bmatrix} cd \\ ce \\ cf \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} cd \\ ce \\ cf \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\left\{c\begin{bmatrix} d \\ e \\ f \end{bmatrix}\right\} = c\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} cd \\ ce \\ cf \end{bmatrix}$$

$$As\ \ we\ have\ A(cB) = cAB\ \ where\ \ c\ is\ a\ real\ number.$$

(ii) $M\begin{bmatrix} cd \\ ce \\ cf \end{bmatrix} = cM\begin{bmatrix} d \\ e \\ f \end{bmatrix}$

Hence M is a linear transformation and matrix of transformation is $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$

Question No. 11 **Marks : 5**

Solve the system 3x + y = 12 by using Jacobi's Method starting x^0 = (0, 0, 0) and only three iterations.

2x – 4y = -6

Solution:

Iteration 1
(12/3 , 3/2)
iteration 2
(3.5 , 3.5)
iteration 3

(2.833, 3.25)

MIDTERM EXAMINATION

MTH501- Linear Algebra (MCQ's File)

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 matrix?

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

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

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

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

Question No: 3

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

Question No:

The equation x = p + t v describes a line

► through v parallel to p

► **through p parallel to v**

► through origin parallel to p

Question No: 5

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

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

►

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

►

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

►

Question No: 6

Every linear transformation is a matrix transformation

► **True**

► False

Question No: 7

A null space is a vector space.

► True
► False

Question No: 8

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

► equals to the old determinant

► equals to -1 times the old determinant

Question 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

► 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

If A is invertible, then $\det(A)\det(A^{-1})=1$.

► True
► False

Question No: 11

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

► $i > j$
► $i < j$
► $i \leq j$
► $i = j$

Question No: 12

The product of upper triangular matrices is

► lower triangular matrix

► **upper triangular matrix**
► diagonal matrix

Question No: 13

The matrix multiplication is associative
► **True**
► False

Question No: 14

We can add the matrices of ______________.
► **same order**
► same number of columns.
► same number of rows
► 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
- ► large difference
- ► different
- **► Same**

Question No: 16

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

- ► slow
- **► fast**
- ► better

Question No: 17

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

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

Question No: 18

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

- ► True
- **► False**

Question No: 19

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

- ► True
- **► False**

Question No: 20

Which of the following is not a linear equation?

- ► $x_1 + 4x_2 + 1 = x_3$
- ► $x_1 = 1$
- ► $x_1 + 4x_2 - \sqrt{2}x_3 = \sqrt{4}$
- ► $x_1 + 4x_1x_2 - \sqrt{2}x_3 = \sqrt{4}$

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 ?
Select correct option:

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:

- **TRUE**
- FALSE

Question No: 23

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

- FALSE
- **TRUE**

Question No: 24

A matrix A and its transpose have the same determinant.

- **TRUE**
- FALSE

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?

- No solution
- **Unique solution**
- Different solutions
- Infinitely many solutions

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.

- TRUE
- **FALSE**

Question No: 27

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

- 2
- 4
- 6
- **8**

Question No: 28

If A is n x n matrix and det (A) = 2 then det (5A) = ________.

- **10**
- 32
- 5
- 8

Question No: 29

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

- multiplication of vectors
- addition of vectors
- subspace {0}
- **scalar multiplication of vectors**

Question No: 30
If one row of A is multiplied by k to produce B, then which of the following condition is true?

Select correct option:

- det(AB) = (detA)(detB)
- **detB = k detA**
- detB = – detA
- detB = detA

MIDTERM EXAMINATION
Fall 2008
MTH501- Linear Algebra (Session - 2)

Time: 60 min
Marks: 38

Question No: 1 (Marks: 1) - Please choose one

If A is a 2×2 matrix, the area of the parallelogram determined by the columns of A is

► A^{-1}
► **det A**

► adj A

Question No: 2 (Marks: 1) - Please choose one

Cramer's rule leads easily to a general formula for

► **the inverse of an $n \times n$ matrix A**

► the adjugate of an $n \times n$ matrix A

► the determinant of an $n \times n$ matrix A

Question No: 3 (Marks: 1) - Please choose one

The transpose of an upper triangular matrix is

► lower triangular matrix
► upper triangular matrix

► **diagonal matrix**

Question No: 4 (Marks: 1) - Please choose one

Let A be a square matrix of order 3×3 with $\det(A) = 21$, then $\det(2A) =$

► **168**
► 186
► 21

► 126

Question No: 5 (Marks: 1) - Please choose one

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

► **True**
► False

Question No: 6 (Marks: 1) - Please choose one

________________ Col A is all of $\mathbb{R}^m$ if and only if

► the equation $Ax = 0$ has a solution for each b in $\mathbb{R}^m$

► **the equation $Ax = b$ has a solution for each b in $\mathbb{R}^m$**
► the equation $Ax = b$ has a solution for a fixed b in $\mathbb{R}^m$.

Question No: 7 (Marks: 1) - Please choose one

________________ If

$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}$ and $B = \begin{bmatrix} B_1 \\ B_2 \end{bmatrix}$, then the partitions of A and B

► are not conformable for block multiplication

► **are conformable for AB block multiplication**

► are not conformable for BA block multiplication

Question No: 8 (Marks: 1) - Please choose one

________________ Two vectors are linearly dependent if and only if they lie

► on a line parallel to x-axis

► **on a line through origin**

► on a line parallel to y-axis

Question No: 9 (Marks: 1) - Please choose one

The equation x = p + t v describes a line

▶ through v parallel to p

▶ through p parallel to v

▶ through origin parallel to p

Question No: 10 (Marks: 1) - Please choose one

Let A be an $m \times n$ matrix. If for each b in $\mathbb{R}^m$ the equation Ax=b has a solution then

▶ A has pivot position in only one row

▶ Columns of A span $\mathbb{R}^m$

▶ Rows of A span $\mathbb{R}^m$

Question No: 11 (Marks: 1) - Please choose one

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

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

▶

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

▶

$$\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -8 \\ -4 & 5 & 9 \end{bmatrix}$$

►

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

Question No: 12 (Marks: 1) - Please choose one

Consider the linear transformation T such that $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is the matrix of linear transformation then $T\begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$ is

$$\begin{bmatrix} 10 \\ 4 \\ 2 \end{bmatrix}$$

►

$$\begin{bmatrix} 1 \\ 0 \\ 9 \end{bmatrix}$$

►

$$\begin{bmatrix} 10 \\ 4 \\ 1 \end{bmatrix}$$

►

$$\begin{bmatrix} 1 \\ 2 \\ 3 \\ 2 \end{bmatrix}$$

▶

Question No: 13 (Marks: 1) - Please choose one

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

- ▶ 15
- ▶ **45**
- ▶ 135
- ▶ 60

Question No: 14 (Marks: 1) - Please choose one

For an n×n matrix $(A^t)^t$ =

- ▶ A^t
- ▶ **A**
- ▶ A^{-1}
- ▶ $(A^{-1})^{-1}$

Question No: 15 (Marks: 1) - Please choose one

Each Linear Transformation T from R^n to R^m is equivalent to multiplication by a matrix A of order

- ▶ m´n
- ▶ **n´m**
- ▶ n´n

► m´m

Question No: 16 (Marks: 1) - Please choose one

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

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

► $\begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \end{bmatrix}$

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

► $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

Question No: 17 (Marks: 2)

Find vector and parametric equations of the plane that passes through the origin of $\boldsymbol{R}^3$ and is parallel to the vectors $\boldsymbol{v}_1 = (1, 2, 5)$ and $\boldsymbol{v}_2 = (5, 0, 4)$.

Question No: 18 (Marks: 2)

Which of the following is true? If V is a vector space over the field F.(justify your answer)

(a) $\{x + y / x \in V, y \in V\} = V$

(b) $\{x + y / x \in V, y \in V\} = V \times V$

(c) $\{\lambda v / v \in V, \lambda \in F\} = F \times V$

Question No: 19 (Marks: 3)

Let

$$v_1 = \begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix}, v_2 = \begin{bmatrix} -2 \\ 1 \\ 7 \end{bmatrix}, and\ y = \begin{bmatrix} h \\ -3 \\ -5 \end{bmatrix}.$$

For what value(s) of h is ***y*** in the plane generated by $\boldsymbol{v_1}$ and $\boldsymbol{v_2}$?

Question No: 20 (Marks: 5)

With T defined by T(x)= Ax , find a vector x whose image under T is b, and determine whether x is unique.

$$\begin{bmatrix} 1 & -5 & -7 \\ -3 & 7 & 5 \end{bmatrix}, b = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$$

Question No: 21 (Marks: 10)

Given A and b , write the augmented matrix for the linear system that corresponds to the matrix equation $Ax = b$ .Then solve the system and write the solution as a vector.

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

	MIDTERM EXAMINATION SPRING 2007 MTH501 - LINEAR ALGEBRA (Session - 4)	Marks: 25 Time: 90min

StudentID/LoginID: ______________________

Student Name: ______________________

Center Name/Code: ______________________

Exam Date: Wednesday, May 16, 2007

Please read the following instructions carefully before attempting any of the questions:

1. Attempt all questions. Marks are written adjacent to each question.

2. Do not ask any questions about the contents of this examination from anyone.

a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.

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c. Write all steps, missing steps may lead to deduction of marks.

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For Teacher's use only											
Question	1	2	3	4	5	6	7	8	9		Total
Marks											

Question No: 1 (Marks: 1) - Please choose one

If ‘ $AB = C$ ’ for matrices $A_{2\times 5}, C_{2\times 10}$;then order of ‘ B ’ is

- ▶ 10×5
- ▶ 2×10
- ▶ 10×2
- ▶ 5×10

Question No: 2 (Marks: 1) - Please choose one

Matrix $\begin{bmatrix} 3 \\ 1 \end{bmatrix}^T$ is an example of

- ▶ Non-Singular matrix
- ▶ Square matrix
- ▶ Column vector
- ▶ Row vector

Question No: 3 (Marks: 1) - Please choose one

Standard matrix for transformation $T(x_1, x_2) = (-x_1 + x_2, x_1 - x_2)$ is

- ▶ $\begin{pmatrix} -1 & 1 \\ 1 & -1 \end{pmatrix}$
- ▶ $\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$
- ▶ $\begin{pmatrix} -1 & 1 \\ -1 & 1 \end{pmatrix}$
- ▶ None of these

Question No: 4 (Marks: 1) - Please choose one

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

Matrix A is singular if

- ▶ $ad = bc$
- ▶ $ad \neq bc$
- ▶ $ad - bc = 1$
- ▶ None of these

Question No: 5 (Marks: 1) - Please choose one

If ‘ H ’ is a subspace of a vector space ‘ $\mathbb{R}^n$ ’, then

- ▶ $0 \in \mathbb{R}^n$ only!
- ▶ $0 \in H$
- ▶ $0 \notin H$
- ▶ Zero vector may or may not in H

Question No: 6 (Marks: 5)

(a) Develop any two linear combinations of vectors ‘ $v_1 = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$ ’ & ‘ $v_2 = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$ ’ 2

(b) Reflection through the origin in $\mathbb{R}^2$ is given by it standard transformation matrix as $T\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$,then find the reflection of the vector $\begin{bmatrix} -7 \\ 8 \end{bmatrix}$ about origin. 3

Question No: 7 (Marks: 5)

$$\begin{pmatrix} -5 & -3 & 2 \\ -5 & -3 & 2 \\ -5 & -3 & 2 \end{pmatrix}$$

(a) Using the matrix invertible theorem, discuss the Invertibility of the matrix

2

(Inverse matrix is not to be found)

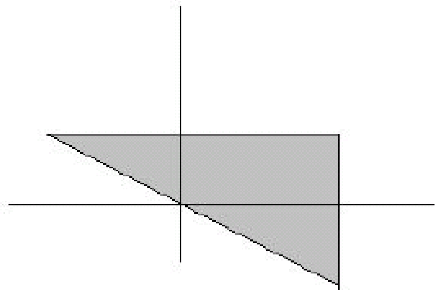
(b) If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and the elementary matrices $E_1 = \begin{pmatrix} 1 & 0 \\ -2 & 1 \end{pmatrix}$ & $E_2 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$,then compute the products: $'E_1A'$ & $'E_2A'$ .Also describe how these products can be obtained by performing elementary row operations on ‘ A ’

3

Question No: 8 (Marks: 5)

(a) For the vectors u, v and the set; $H = Span\{u, v\}$ .Determine whether zero vector & ‘ $-u$ ’ are in ‘ H ’ 3

(b) In the figure, shaded area display a set in $\mathbb{R}^2$.



Give a specific reason why the indicated region is not a subspace of $\mathbb{R}^2$.

2

Question No: 9 (Marks: 5)

(a) Prove or disprove that the vector $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$ is in the column space generated by the matrix

$$\begin{pmatrix} -6 & 12 \\ -3 & 6 \end{pmatrix}$$

3

.

(b) For the matrix $A = \begin{pmatrix} 2 & -1 & 1 \\ 3 & -2 & -1 \\ 0 & 5 & 1 \end{pmatrix}$;evaluate '$2A_{21} + 3A_{22}$' where

$A_{21} =$ Cofactor of entry '3'

$A_{22} =$ Cofactor of entry '-2'

2

MTH501 Linear Algebra

Mid Term Examination – Spring 2006

Time Allowed: 90 Minutes

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Question No. 1	**Marks : 8**

The augmented matrix of a linear system has been transformed by row operations into the form below. Write the general solution in **Parametric vector form**.

$$\begin{bmatrix} 1 & 5 & 2 & -6 \\ 0 & 4 & -7 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Question No. 2	**Marks : 8**

A transformation $T: R^2 \to R^3$ defined by ***T(x) = Ax,*** so that

$$T(x) = \begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 7 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} x_1 - 3x_2 \\ 3x_1 + 5x_2 \\ -x_1 + 7x_2 \end{bmatrix}$$

Question No. 3	**Marks : 5**

Calculate the ***area of the parallelogram*** determined by the points ***(-2, -2), (0, 3), (4, -1) and (6, 4).***

Question No. 4	**Marks : 1**

A linear transformation $T: R^2 \to R^2$ defined by $T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ then $T(\begin{bmatrix} 4 \\ 1 \end{bmatrix}) =$__________

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

★ $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$

★ $\begin{bmatrix} 4 \\ 1 \end{bmatrix}$

★ $\begin{bmatrix} -3 \\ 3 \end{bmatrix}$

Question No. 5	**Marks : 6**

Let. $\boldsymbol{A} = \begin{bmatrix} -6 & 12 \\ -3 & 6 \end{bmatrix}$ and $\boldsymbol{w} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ Determine if ***w*** is in Col ***A***. Is ***w*** in Null ***A***?

Question No. 6	**Marks : 1**

$A = \begin{bmatrix} 1 & -2 & 5 & 0 \\ 0 & 4 & 4 & -1 \\ 0 & 0 & 5 & 7 \\ 0 & 0 & 0 & 7 \end{bmatrix}$ **detA** = 140 Then **detA$^{\mathbf{T}}$** = --------

- ★ 0
- ★ 140
- ★ 6
- ★ -20

Question No. 7	Marks : 1

The augmented matrix of system of linear equations $\begin{matrix} x_1 + 2x_3 = 0 \\ x_1 + x_2 - 9x_3 = -1 \end{matrix}$ is

- ★ $\begin{bmatrix} 1 & 0 & 2 & 0 \\ 1 & 1 & -9 & -1 \end{bmatrix}$
- ★ $\begin{bmatrix} 1 & 2 & 0 & 0 \\ 1 & 1 & -9 & 1 \end{bmatrix}$
- ★ $\begin{bmatrix} 1 & 2 & 0 \\ 1 & 1 & -9 \end{bmatrix}$
- ★ None of the other.

Question No. 8	Marks : 1

Identity the true statement

- ★ The columns of a matrix ***A*** is linearly independent if the equation ***Ax = 0*** has trivial solution
- ★ The columns of a matrix ***A*** is linearly independent if the equation ***Ax = 0*** has non trivial solution.
- ★ If one row in echelon form of an augmented matrix is [0 0 0 0 5 0], then associated linear system is inconsistent.
- ★ Every transformation is linear transformation.

Question No. 9	Marks : 8

Find ***LU factorization*** of the matrix $A = \begin{bmatrix} 2 & 5 \\ -3 & -4 \end{bmatrix}$

Question No. 10	Marks : 1

Let $T : R^n \to R^m$ be a linear transformation and **A** be the standard matrix of **T** , then T maps

R^n onto R^m if and only if

- ★ The columns of **A** span R^m.
- ★ The columns of **A** span R^n
- ★ The columns of **A** are linearly independent
- ★ None of the other.