MIDTERM EXAMINATION
Spring 2010
MTH501- Linear Algebra (Session - 4)

Ref No: 1508121
Time: 60 min
Marks: 40

Student Info	
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Center:	OPKST
ExamDate:	6/6/2010 12:00:00 AM

For Teacher's Use Only									
Q No.	1	2	3	4	5	6	7	8	Total
Marks									
Q No.	9	10	11	12	13	14	15	16	
Marks									
Q No.	17	18	19	20	21	22	23	24	
Marks									
Q No.	25	26							
Marks									

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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 kA = det A

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

The equation x = p + t v describes a line

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- 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.

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

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

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

-

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

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► 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

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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
- ► 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

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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: 2)

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

Question No: 22 (Marks: 2)

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

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

Use this information to find a basis for H.

Question No: 23 (Marks: 3)

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

Find

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Question No: 24 (Marks: 3)

Determine bases for the plane 3x – 2y + 5z = 0 as a subspace of R^3

Question No: 25 (Marks: 5)

$$\begin{bmatrix} I & 0 \\ A & I \end{bmatrix}$$

Show that is invertible and find its inverse.

Question No: 26 (Marks: 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.

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