	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.

b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.

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

****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.**

(Marks: 1)

Question No: 1 - Please choose one

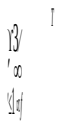
For Teacher's use only

Question Marks	1	2	3	4	5	6	7	8	9		Total

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

- ▶ $10 \cdot 5$
- ▶ $2 \cdot 10$
- ▶ $10 \cdot 2$
- ▶ $5 \cdot 10$

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



Matrix 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

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

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

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

Matrix is singular if

- $ad = bc$
- $ad \; \bar{} \; bc$
- $ad - bc = 1$
- None of these

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

If ' H ' is a subspace of a vector space ' $\mathbf{R}^n$ ', then

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

Question No: 6 (Marks: 5)

$$v_1 = \begin{pmatrix} -2 \\ 3 \end{pmatrix} \qquad \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

(a) Develop any two linear combinations of vectors ' ' &' ' [2]

(b) Reflection through the origin in $\mathbf{R}^2$ is given by it standard transformation matrix as

$$T\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \qquad \begin{pmatrix} -7 \\ -8 \end{pmatrix}$$

,then find the reflection of the vector about origin. [3]

Question No: 7 (Marks: 5)

□ □5 □3 2 □
□ □
□ □5 □3 2 □
□ □5 □3 2 □□
□

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

2

(Inverse matrix is not to be found)

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

$$E_1 = \begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix} \quad \& \quad E_2 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

(b) If and the elementary matrices ,then compute the products: $E_1 A \;\&\; E_2 A$ .Also describe how these products can be obtained by performing elementary row operations on ' A '

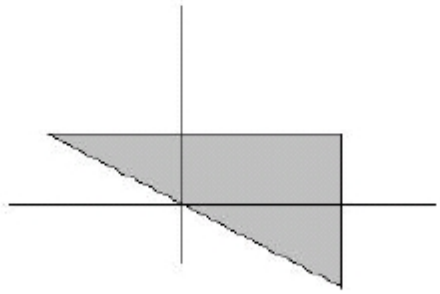
3

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 $\mathbf{R}^2$.



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

2

Question No: 9 (Marks: 5)

(a) Prove or disprove that the vector is in the column space generated by the matrix

□ □6 12 □
□ □
□ □3 6 □

3

.

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

(b) For the matrix ;evaluate ‘ ’ where $2A_{21} + 3A_{22}$

$A_{21} =$
Cofactor of entry ‘3’
$A_{22} =$
Cofactor of entry ‘-2’

2

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