MTH501 Linear Algebra

Mid Term Examination – Spring 2006

Time Allowed: 90 Minutes

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.**

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**.

Υ1 5 2 □ 6⁄

′ ∞

≤0 0 0 0*f*

Question No. 2 **Marks : 8**

′04□7 2∞

′ ∞

vu786.com

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

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

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 $T(x) = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ then $T(-4) =$_____

(1) $\begin{pmatrix} -1 \\ -4 \end{pmatrix}$

(2) $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$

(3) $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$

(4) $\begin{pmatrix} -3 \\ -3 \end{pmatrix}$

Question No. 5 **Marks : 6**

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

Question No. 6 **Marks : 1**

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

vu786.com

0
140
6
-20

Question No. 7 **Marks : 1**

The augmented matrix of system of linear equations $x_1 + 2x_3 = 0$, $x_1 + x_2 - 9x_3 = -1$ 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 $A = \begin{bmatrix} 2 & 5 \\ -3 & -4 \end{bmatrix}$

vu786.com

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.

vu786.com