

MATHEMATICS 221 L05 FALL 2006
MIDTERM EXAMINATION
Friday, November 3, 2006 Duration: 50 minutes

I.D.#

I agree that this paper may be placed at the front of the classroom for pick-up.				
Please initial either YES		or NO		

NO CALCULATORS ALLOWED
ANSWER ALL QUESTIONS
SHOW ALL WORK

LAST NAME _____ FIRST NAME _____

[5] 1. Solve the system:

$$\begin{aligned} 2x + 4y + z - 5u &= 5 \\ -2x - 4y + z + 7u &= -3 \end{aligned}$$

[5] 2. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. Express A as a product of elementary matrices.

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- [5] 3. Let A, B, C denote matrices. Show that the statement: "If $AB = AC$ and $A \neq 0$ then $B = C$ " is false.

- [5] 4. Given that $\left(\frac{1}{2}A^T + 3I\right)^{-1} = 2 \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$. Find A .

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[10]

5. Given that $A = \begin{bmatrix} -2 & -1 & -4 \\ 3 & 1 & 6 \\ 2 & 2 & 6 \end{bmatrix}$

(a) Find $\text{adj } A$.

(b) Compute $A \cdot \text{adj } A$.

(c) Find $\det A$.

[10] **6.** Let T be the linear transformation from \mathbb{R}^2 to \mathbb{R}^2 so that $T\left(\begin{bmatrix} 2 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and

$$T\left(\begin{bmatrix} 3 \\ 2 \end{bmatrix}\right) = \begin{bmatrix} 2 \\ 3 \end{bmatrix}.$$

(a) Find the matrix for T , that is, find a matrix A so that $T(X) = AX$ for all $X \in \mathbb{R}^2$.

(b) Is T invertible? Explain. If T is invertible, find $T^{-1}\left(\begin{bmatrix} 1 \\ -1 \end{bmatrix}\right)$.