

EXAM 4 - MATH 111

DATE: Friday, April 9

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Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Use substitution to solve the system of equations $\begin{cases} 5x + 3y = 7 \\ -2x - 7y = -26 \end{cases}$

2. Use the augmented matrix method (Gauss-Jordan) to solve the system

$$\begin{cases} x + y + z = 4 \\ 3x - 2y + z = 17 \\ -2x + y + 3z = 8 \end{cases}$$

3. Solve the matrix equation $X^2 = X + \begin{bmatrix} 12 & 5 \\ 0 & 0 \end{bmatrix}$, where $X = \begin{bmatrix} x & y \\ 0 & 1 \end{bmatrix}$.

4. Find the inverse of $A = \begin{bmatrix} 0 & 1 & -1 \\ 1 & 0 & 1 \\ 2 & 0 & 0 \end{bmatrix}$, if it exists.

5. Let

$$A = \begin{bmatrix} 1 & 2 & -1 \\ -2 & 3 & 5 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 2 & 5 \\ -3 & -7 \end{bmatrix} + \begin{bmatrix} 3 & -1 \\ 2 & 0 \end{bmatrix}.$$

Compute A . Show all your work.

6. (a) Answer true or false without explanations:

$\emptyset \in \{1, 2, 3, 4, 5\}$	_____
$4 \notin \{1, 2, \{2, 3\}, \{4\}\}$	_____
$\{1, 2\} \subseteq \{1, 2, \{3\}, \{4\}\}$	_____
$\{1, 2\} \subseteq \{1, \{1, 2\}, 3\}$	_____
$\{\{1\}\} \subseteq \{1, 2, \{1\}, \{1, 2\}\}$	_____
$\{2, 3\} \in \{1, 2, 3\}$	_____

(b) Let $U = (-\infty, \infty)$ be the universe. Suppose that $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ and $B = (-\infty, -1) \cup [5, +\infty)$. Find the set $A \cap B'$.