

MATH 111 – EXAM 2 – 30 MAY 2013

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit. This exam is counted out of a total of 80 points.

1. Consider the system of linear equations

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

- (a) (5 pts.) Write down the 2×3 matrix that represents this system.
- (b) (10 pts.) Solve the system by using the Gauss-Jordan method to transform this system into an equivalent diagonal system having the form $\begin{bmatrix} 1 & 0 & * \\ 0 & 1 & * \end{bmatrix}$. Be sure to show all work.
- (c) (5 pts.) Write the system as a matrix equation of the form $AX = b$, where A , X , and b are matrices.
- (d) (10 pts.) Find the inverse of the matrix A you wrote down in part (c), and use it to solve the original linear system.

2. (10 pts. each) Find all solutions, if any, to the following linear systems. Be sure to show all work.

$$\begin{aligned} x - 3y + z &= 5 \\ (a) \quad y - 4z &= 1 \\ x - 2y - 3z &= 6 \end{aligned}$$

$$\begin{aligned} x + 2y + z &= 3 \\ (b) \quad x + y + z &= 3 \\ 2x + y + 2z &= 1 \end{aligned}$$

3. (5 pts. each) Let $A = \begin{bmatrix} 2 & -1 \\ 4 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 \\ 2 & 0 \\ 0 & 1 \end{bmatrix}$, and $C = \begin{bmatrix} 1 & 6 \\ 2 & 3 \end{bmatrix}$. Compute each of the following matrices, whenever the expression makes sense. If it does not, then so state.

$$(a) BA \quad (b) CB \quad (c) A + C$$

4. Two stores sell the same brand and style of a dresser and a bookcase. Matrix A gives the retail prices in dollars for the items. Matrix B gives the number of each item sold at each store in the month of August and matrix C gives the number of each item sold at each store in the month of September.

		Dresser	Nightstand	Bookcase		
		$A = \begin{bmatrix} 250 & 80 & 60 \end{bmatrix}$				
Store 1	Store 2				Store 1	Store 2
		$B = \begin{bmatrix} 40 & 35 \\ 30 & 35 \\ 50 & 75 \end{bmatrix}$			$C = \begin{bmatrix} 20 & 35 \\ 40 & 40 \\ 25 & 30 \end{bmatrix}$	

- (a) (10 pts.) Calculate the matrix AB and give an interpretation of its entries.
- (b) (5 pts.) Give an interpretation of the entries of the matrix $B - C$. Do not compute the matrix.
- (c) (5 pts.) Give an interpretation of the entries of the matrix $AB - AC$. Do not compute the matrix.