

MAT 1302 E, Fall 2013

Homework 2

Professor: Catalin Rada

DUE DATE October 29, 2013, by 7:00p.m. in the drop box in 585 King Edward ave. (KED)

For all of the questions below, you must show each step in any row reduction and state what operation you are performing at each step.

1. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & k \\ 1 & -2 & k+1 \end{bmatrix}$.

- (a) **(3 points)** Find all values of k for which A is invertible.
- (b) **(2.5 points)** Find the inverse of A when $k = 0$
- (c) **(1.5 points)** Use part (b) to solve the matrix equation $Ax = b$ where

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & -2 & 1 \end{bmatrix} \quad \text{and} \quad b = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$

2. **(4 points)**

Let $A = \begin{bmatrix} -1 & 2 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 20 \\ 4 & 10 \end{bmatrix}$ be two matrices. Is there a 2×2 matrix X such that $AB(A + 3BX^T)B^{-1}A^{-1} = I_2$? If the answer is affirmative, find X .

3. **(3 points)** Let $A = \begin{bmatrix} 0 & 6 & 5 & 4 \\ 0 & 0 & 3 & 2 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$. Compute A^{2013} .

Hint: Find A^n for $n \leq 4$.