

NAME:

Group Number:

ID:

244
First Midterm, October 2013

I) Give an example of:

a) An elementary matrix;

b) A matrix in row echelon form, which is *not* in reduced row echelon form;

c) A homogeneous linear system of equations.

d) Two matrices A and B , such that $AB \neq BA$.

II) a) If A , B and C are square matrices of the same size, prove that

$$(A - B)(C - A) + (C - B)(A - C) + (C - A)^2 = 0.$$

b) If $A = \begin{bmatrix} 1 & 3 \\ 2 & 5 \\ -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 \\ 1 & 4 \\ -7 & 5 \end{bmatrix}$, find a matrix D , such that $2A + B - D$ is the 3×2 zero matrix.

III) Given the system

$$\begin{cases} 2x_1 + 8x_2 + 6x_3 = 20 \\ 4x_1 + 2x_2 - 2x_3 = -2 \\ 3x_1 - x_2 + x_3 = 11 \end{cases}$$

(a) Write the system in the form $A\mathbf{x} = \mathbf{b}$;

(b) Find A^{-1} ;

(c) Solve the system.

IV) Solve the system, using Gauss-Jordan elimination:

$$\begin{cases} 2x_1 - x_2 - 3x_3 = -3 \\ -2x_1 + x_2 + x_3 = -1 \\ 2x_1 + 3x_2 - x_3 = -3. \end{cases}$$