

Linear Algebra — Class Exercise 2

Gaussian Elimination

1. Two of these matrices are in row echelon form and two are not. Say which two are not, and for each name the condition it breaks.

$$A = \begin{bmatrix} 1 & -3 & 5 & 0 \\ 0 & 1 & 2 & -4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 4 & -1 \\ 0 & 5 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} 0 & 1 & 3 & 2 \\ 1 & 0 & -2 & 5 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad D = \begin{bmatrix} 0 & 1 & -6 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

2. Solve

$$x + 2y - z = 7$$

$$2x + 4y + z = 8$$

$$x + 5y + 2z = 4$$

by reducing the augmented matrix to row echelon form and then back-substituting. Name every row operation.

3. Reduce

$$x + y - 2z = 1$$

$$2x + 3y - z = 4$$

$$3x + 4y - 3z = 8$$

to row echelon form and state its solution set.