

Homework Set 1

Due 9/28/2018

1. Use row operations to transform the following matrices to their reduced row echelon forms (RREF). In other words, find the Gauss–Jordan forms. Remember to specify the operations you use at each step.

(a)

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 2 & 1 & 0 \\ -3 & 2 & 1 \end{bmatrix}$$

(c)

$$\begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

(d)

$$\begin{bmatrix} -1 & 2 & 0 \\ 2 & 2 & 1 \\ 0 & 1 & -2 \end{bmatrix}$$

(e)

$$\begin{bmatrix} 1 & 7 & 0 & 6 & 5 \\ 0 & 0 & 1 & -2 & -3 \\ -1 & -7 & -4 & 2 & 7 \end{bmatrix}$$

(f)

$$\begin{bmatrix} 2 & -4 & 2 \\ 3 & -4 & 5 \\ 0 & 1 & 1 \\ -3 & 5 & -4 \end{bmatrix}$$

(g)

$$\begin{bmatrix} 1 & 3 & 9 & 2 & -1 \\ 1 & 0 & 3 & -4 & 3 \\ 0 & 1 & 2 & 3 & -1 \\ -2 & 3 & 0 & 5 & 4 \end{bmatrix}$$

2. Solve the following systems of linear equations.

(a)

$$\begin{cases} x - 5y = 1 \\ 3x - 7y = 5 \end{cases}$$

(b)

$$\begin{cases} x - 3y = 5 \\ -x + y + 5z = 2 \\ y + z = 0 \end{cases}$$

(c)

$$\begin{cases} x - 3y + 4z = -4 \\ 3x - 7y + 7z = -8 \\ -4x + 6y - z = 7 \end{cases}$$

(d)

$$\begin{cases} x + 3y + 5z = 7 \\ 3x + 5y + 7z = 9 \\ 5x + 7y + 9z = 1 \end{cases}$$

(e)

$$\begin{cases} x_1 - 7x_2 + 6x_4 = 5 \\ x_3 - 2x_4 = -3 \\ -x_1 + 7x_2 - 4x_3 + 2x_4 = 7 \end{cases}$$

(f)

$$\begin{cases} x + y = 1 \\ y + z = 2 \\ z + x = 3 \\ x - y - 2z = 4 \end{cases}$$

(g)

$$\begin{cases} x - my = 1 \\ 3x - 7y = 5 \end{cases}$$

Here m is a parameter assumed to be known.