Worksheet 3/25/2026

1) Determine whether the given matrix is in echelon form.

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

b) $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 2 & 1 \end{bmatrix}$

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

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

e) $\begin{bmatrix} 0 & 1 & 3 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

f) $\begin{bmatrix} 2 & 1 & 3 & 0 \\ 0 & 3 & 9 & 2 \\ 0 & 0 & 2 & -1 \end{bmatrix}$

2) Use elementary row operations to find an echelon form of the matrix

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

3) Use Problem 2 to solve the following system:

$$\begin{cases} x + 2y + 3z = 5 \\ 2x - y - z = -1 \\ -4x + y + z = 1 \end{cases}$$

4) The augmented matrix of a certain linear system has the reduced echelon form as follows. What can you say about this linear system?

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

5) The augmented matrix of a certain linear system has the augmented matrix as follows. Solve this system.

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