Find the column space

$$\begin{bmatrix} 1 & 2 & 5 \\ 2 & 4 & 10 \\ 0 & 0 & 0 \end{bmatrix}$$

$$C = a\begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$$

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

f

$x_1 = -2 \quad -5$

$x_2 = 1 \quad 0$

$x_3 = 0 \quad 1$

$x_1 + 2x_2 + 5x_3 = 0$

$$N = a\begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix} + b\begin{bmatrix} -5 \\ 0 \\ 1 \end{bmatrix}$$

E11.

Show your work for full credits.

1. Evaluate

$$\begin{bmatrix} 2 & -1 \\ 5 & 4 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} 3 & -2 \\ 8 & 4 \end{bmatrix}$$

2. Evaluate

$$\begin{bmatrix} 2 & -1 \\ 5 & 4 \end{bmatrix}\begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} -1 & -2 \\ 17 & -5 \end{bmatrix}$$

3. Express the system of equations in column form and matrix form.

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

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

$$\begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ -2 \end{bmatrix}$$

4. Is the given a singular case? Justify

$$3x - y = 7$$
$$-6x + 2y = 5$$

$$\begin{bmatrix} 3 & -1 \\ -6 & 2 \end{bmatrix}$$

since $\begin{bmatrix} 3 \\ -6 \end{bmatrix}\left(-\frac{1}{3}\right) = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$, it is singular

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

5. Find the values of x, y, and z for the given equations by elimination method.

$$x + y - z = -4$$
$$3x - y + z = 8$$
$$-2x + 3y - 2z = -14$$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & -4 \\ 3 & -1 & 1 & 8 \\ -2 & 3 & -2 & -14 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & -4 \\ 0 & -4 & 4 & 20 \\ 0 & 5 & -4 & -22 \end{array}\right]$$

$$= \left[\begin{array}{ccc|c} 1 & 1 & -1 & -4 \\ 0 & 1 & -1 & -5 \\ 0 & 0 & 1 & 3 \end{array}\right]$$

$x = 1$
$y = -2$
$z = 3$,

6. Find the inverse of the given matrix. Then, show that product of the given matrix and the inverse is the identity.

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

$$\left[\begin{array}{cc|cc} 1 & 0 & 2 & 5 \\ 0 & 1 & 1 & 3 \end{array}\right]$$

$$\left[\begin{array}{cc|cc} 1 & -1 & 1 & 2 \\ 0 & 1 & 1 & 3 \end{array}\right]$$

$$\left[\begin{array}{cc|cc} 1 & -1 & 1 & 2 \\ -1 & 2 & 0 & 1 \end{array}\right]$$

$$\left[\begin{array}{cc|cc} 3 & -5 & 1 & 0 \\ -1 & 2 & 0 & 1 \end{array}\right]$$