

Mar. 22, 2017

Sect. 6-3

Matricies

Augmented Matrix

Row Operations

Row Echelon Form

$$-2x + 6y = -22$$

$$x + 2y = -9$$

$$\left[ \begin{array}{cc|c} -2 & 6 & -22 \\ 1 & 2 & -9 \end{array} \right]$$

# Row Operations

1. Swap two rows
2. Mult. a row by a constant
3. Add a multiple of one row to a second row to replace the second row.

$$\left[ \begin{array}{cc|c} -2 & 6 & -22 \\ 1 & 2 & -9 \end{array} \right] \begin{array}{l} \curvearrowright \\ \curvearrowleft \end{array} \left[ \begin{array}{cc|c} 1 & 2 & -9 \\ -2 & 6 & -22 \end{array} \right] \begin{array}{l} \\ 2R_1 + R_2 \rightarrow R_2 \end{array}$$

$$\left[ \begin{array}{cc|c} 1 & 2 & -9 \\ 0 & 10 & -40 \end{array} \right] \begin{array}{l} \\ \frac{1}{10}R_2 \rightarrow R_2 \end{array}$$

$$\left[ \begin{array}{cc|c} 1 & 2 & -9 \\ 0 & 1 & -4 \end{array} \right]$$

$$\left[ \begin{array}{cc|c} 1 & 2 & -9 \\ 0 & 1 & -4 \end{array} \right]$$

$$(-1, -4)$$

$$y = -4$$

$$x + 2y = -9$$

$$x + 2(-4) = -9$$

$$x - 8 = -9$$

$$x = -1$$

$$-x + y - z = -14$$

$$2x - y + z = 21$$

$$3x + 2y + z = 19$$

$$\left[ \begin{array}{ccc|c} -1 & 1 & -1 & -14 \\ 2 & -1 & 1 & 21 \\ 3 & 2 & 1 & 19 \end{array} \right] \begin{array}{l} 2R_1 + R_2 \rightarrow R_2 \\ 3R_1 + R_3 \rightarrow R_3 \end{array}$$

$$\left[ \begin{array}{ccc|c} -1 & 1 & -1 & -14 \\ 0 & 1 & -1 & -7 \\ 0 & 5 & -2 & -23 \end{array} \right]$$

$$\left[ \begin{array}{ccc|c} -1 & 1 & -1 & -14 \\ 0 & 1 & -1 & -7 \\ 0 & 5 & -2 & -23 \end{array} \right] \begin{array}{l} -R_1 \rightarrow R_1 \\ -5R_2 + R_3 \rightarrow R_3 \end{array}$$

$$\left[ \begin{array}{ccc|c} 1 & -1 & 1 & 14 \\ 0 & 1 & -1 & -7 \\ 0 & 0 & 3 & 12 \end{array} \right] \frac{1}{3}R_3 \rightarrow R_3$$

$$\left[ \begin{array}{ccc|c} 1 & -1 & 1 & 14 \\ 0 & 1 & -1 & -7 \\ 0 & 0 & 1 & 4 \end{array} \right]$$

$$\left[ \begin{array}{ccc|c} 1 & -1 & 1 & 14 \\ 0 & 1 & -1 & -7 \\ 0 & 0 & 1 & 4 \end{array} \right]$$

$$x - y + z = 14$$

$$x - (-3) + 4 = 14$$

$$x = 7$$

$$z = 4$$

$$y - z = -7$$

$$y - 4 = -7$$

$$y = -3$$

$$(7, -3, 4)$$



$$\left[ \begin{array}{ccc|c} 1 & -1 & 1 & 14 \\ 0 & 1 & -1 & -7 \\ 0 & 0 & -1 & 4 \end{array} \right] \quad R_2 + R_1 \rightarrow R_1$$

$$\left[ \begin{array}{ccc|c} 1 & 0 & 0 & 7 \\ 0 & 1 & -1 & -7 \\ 0 & 0 & -1 & 4 \end{array} \right] \quad R_3 + R_2 \rightarrow R_2$$

$$\left[ \begin{array}{ccc|c} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 4 \end{array} \right] \quad (7, -3, 4)$$