Math 116 Mon 5 Dec 2016

5.2 Matrix solutions of Linear Systems

32) Solve

$$\begin{cases} -x + 2y + 6z = 2 \\ 3x + 2y + 6z = 6 \\ x + 4y - 3z = 1 \end{cases}$$

TI-84 commands

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

$-1 \cdot R_1$

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

*row(-1, Ans, 1)

$-3R_1 + R_2 \rightarrow$
$-1 \cdot R_1 + R_3 \rightarrow$

$$\begin{bmatrix} 1 & -2 & -6 & -2 \\ 0 & 8 & 24 & 12 \\ 0 & 6 & 3 & 3 \end{bmatrix}$$

*row+(-3, Ans, 1, 2)
*row+(-1, Ans, 1, 3)

$\frac{1}{8} R_2 \rightarrow$

$$\begin{bmatrix} 1 & -2 & -6 & -2 \\ 0 & 1 & 3 & 3/2 \\ 0 & 6 & 3 & 3 \end{bmatrix}$$

*row($\frac{1}{8}$, Ans, 2)

$2R_2 + R_1 \rightarrow$
$-6R_2 + R_3 \rightarrow$

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 3 & 3/2 \\ 0 & 0 & -15 & -6 \end{bmatrix}$$

*row+(2, Ans, 2, 1)
*row+(-6, Ans, 2, 3)

$-\frac{1}{15} R_3 \rightarrow$

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

*row(-1/15, Ans, 3)

$-3R_3 + R_2 \rightarrow$

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 3/10 \\ 0 & 0 & 1 & 2/5 \end{bmatrix}$$

*row+(-3, Ans, 3, 2)

$\therefore$ Solution: $(x, y, z) = (1, \frac{3}{10}, \frac{2}{5})$