

Elementary Row Operations:

- 1) Interchange 2 rows
- 2) Multiply a Row by a Constant
- 3) Add Rows

Name _____

Advanced Algebra

Unit 6: Assignment #15

Elementary Row Operations on 3 by 3 Day #1

Translate the following 3 by 3 systems of equations into a Matrix and perform elementary row operations to solve the system.

Your Goal is to get the following:

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

$$1) \begin{cases} x + 3y + z = 3 \\ x + 5y + 5z = 1 \\ 2x + 6y + 3z = 8 \end{cases}$$

$$\begin{array}{l} 1 \ 3 \ 1 : 3 \\ 1 \ 5 \ 5 : 1 \\ 2 \ 6 \ 3 : 8 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 1 : 3 \\ 0 \ 2 \ 4 : -2 \\ 2 \ 6 \ 3 : 8 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 1 : 3 \\ 0 \ 2 \ 4 : -2 \\ 0 \ 0 \ 1 : 2 \end{array}$$

$$\begin{cases} x = 16 \\ y = -5 \\ z = 2 \end{cases}$$

$$2) \begin{cases} 3x + 6y + 6z = 3 \\ x + 3y + 10z = -10 \\ x + 2y + 5z = -11 \end{cases}$$

$$\begin{array}{l} 1 \ 3 \ 10 : -10 \\ 3 \ 6 \ 6 : 3 \\ 1 \ 2 \ 5 : -11 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 10 : -10 \\ 0 \ -3 \ -24 : 33 \\ 1 \ 2 \ 5 : -11 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 10 : -10 \\ 0 \ -3 \ -24 : 33 \\ 0 \ -1 \ -5 : 21 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 10 : -10 \\ 0 \ -3 \ -24 : 33 \\ 0 \ 0 \ -9 : -30 \end{array}$$

$$\begin{cases} x = 69.2 \\ y = -37.4 \\ z = 3.3 \end{cases}$$

$$3) \begin{cases} y - 5z = 15 \\ x + 2y - z = 7 \\ -3x - y + 2z = 10 \end{cases}$$

$$\begin{array}{l} 1 \ 2 \ -1 : 7 \\ 0 \ 1 \ -5 : -15 \\ -3 \ -1 \ 2 : 10 \end{array}$$

$$\begin{array}{l} 1 \ 2 \ -1 : 7 \\ 0 \ 1 \ -5 : -15 \\ 0 \ 5 \ -1 : 31 \end{array}$$

$$\begin{array}{l} 1 \ 2 \ -1 : 7 \\ 0 \ 1 \ -5 : -15 \\ 0 \ 0 \ 24 : -44 \end{array}$$

$$\begin{cases} x = -6.8 \\ y = 6 \\ z = -1.8 \end{cases}$$

$$4) \begin{cases} 2x - 10y + 3z = -20 \\ x - 3y + 7z = 0 \\ x - 5y + z = -10 \end{cases}$$

$$\begin{array}{l} 2 \ -10 \ 3 : -20 \\ 1 \ -3 \ 7 : 0 \\ 1 \ -5 \ 1 : -10 \end{array}$$

Switch

$$\begin{array}{l} 1 \ -3 \ 7 : 0 \\ 2 \ -10 \ 3 : -20 \\ 1 \ -5 \ 1 : -10 \end{array}$$

$-2R_1 + R_2$

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

$$\begin{array}{l} 1 \ -3 \ 7 : 0 \\ 0 \ -4 \ -11 : -20 \\ 1 \ -5 \ 1 : -10 \end{array}$$

$-R_1 + R_3$

$$\begin{array}{l} 1 \ -3 \ 7 : 0 \\ 0 \ -4 \ -11 : -20 \\ 0 \ -2 \ -6 : -10 \end{array}$$

$-\frac{1}{2}R_2 + R_3$

$$\begin{array}{l} 1 \ -3 \ 7 : 0 \\ 0 \ -4 \ -11 : -20 \\ 0 \ 0 \ 3.5 : 0 \end{array} \quad \begin{array}{l} x = k \\ y = 5 \\ z = 0 \end{array}$$

Switch

$$\begin{array}{l} 1 \ 3 \ 3 : 2 \\ 2 \ 4 \ 5 : 5 \\ 2 \ 4 \ 4 : 2 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 3 : 2 \\ 0 \ 2 \ -1 : 1 \\ 2 \ 4 \ 4 : 2 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 3 : 2 \\ 0 \ -2 \ -1 : 1 \\ 0 \ -2 \ -2 : -2 \end{array}$$

$$\begin{array}{l} 1 \ 3 \ 3 : 2 \\ 0 \ -2 \ -1 : 1 \\ 0 \ 0 \ -1 : -3 \end{array}$$

$$\begin{array}{l} x = -1 \\ y = -2 \\ z = 3 \end{array}$$

$$6) \begin{cases} x - y + 3z = 6 \\ x - 2y = 5 \\ 2x - 2y + 5z = 9 \end{cases}$$

$$\begin{array}{l} -11 \\ -8 \\ 3 \end{array}$$

$$7) \begin{cases} x + 2z = 4 \\ x + y + z = 6 \\ 3x + 3y + 4z = 28 \end{cases}$$

$$\begin{array}{l} -16 \\ 12 \\ 10 \end{array}$$

$$\begin{array}{l} 1 \ 0 \ 2 : 4 \\ 1 \ 1 \ 1 : 6 \\ 3 \ 3 \ 4 : 28 \end{array}$$

$$\begin{array}{l} 1 \ 0 \ 2 : 4 \\ 0 \ 1 \ -1 : 2 \\ 3 \ 3 \ 4 : 28 \end{array}$$

$$\begin{array}{l} 1 \ 0 \ 2 : 4 \\ 0 \ 1 \ -1 : 2 \\ 0 \ 3 \ -2 : 16 \end{array} \quad \begin{array}{l} 1 \ 0 \ 2 : 4 \\ 0 \ 1 \ -1 : 2 \\ 0 \ 0 \ 1 : 10 \end{array}$$

$$8) \begin{cases} -2x - 2y - 15z = 0 \\ x + 2y + 2z = 18 \\ 3x + 3y + 22z = 2 \end{cases}$$