

Name \_\_\_\_\_

Advanced Algebra

Unit 6: Assignment #16

Elementary Row Operations on 3 by 3 Day #2

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:

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

$$1) \begin{cases} x - y - 2z = 3 \\ 0x + 2y + 3z = 8 \\ 0x + 0y + z = 2 \end{cases}$$

$$\begin{aligned} x &= 8 \\ y &= 1 \\ z &= 2 \end{aligned}$$

$$2) \begin{cases} x - 2y + z = 7 \\ 4x + 2y - z = 3 \\ x + y - 5z = 13 \end{cases}$$

$$\begin{aligned} 1 & -2 \ 1 : 7 \\ 4 & 2 \ -1 : 3 \\ 1 & 1 \ -5 : 13 \end{aligned}$$

$$\begin{aligned} 1 & -2 \ 1 : 7 \\ 0 & 0 \ -5 : -25 \\ 1 & 1 \ -5 : 13 \end{aligned}$$

$$\begin{aligned} 1 & -2 \ 1 : 7 \\ 0 & 10 \ -5 : -25 \left(-\frac{2}{10}\right) \\ 0 & 3 \ -6 : 6 \end{aligned}$$

$$\begin{aligned} 1 & -2 \ 1 : 7 \\ 0 & 10 \ -5 : -25 \\ 0 & 0 \ -4.5 : 13.5 \end{aligned}$$

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

$$3) \begin{cases} 2x + y + z = -3 \\ 3x - 2y + 4z = 9 \\ x + 2y - 2z = -13 \end{cases}$$

$$\begin{aligned} 1 & 2 \ -2 : -13 \\ 3 & -2 \ 4 : 9 \\ 2 & 1 \ 1 : -3 \end{aligned}$$

$$\begin{aligned} 1 & 2 \ -2 : -13 \\ 0 & -8 \ 10 : 48 \\ 2 & 1 \ 1 : -3 \end{aligned}$$

$$\begin{aligned} 1 & 2 \ -2 : -13 \\ 0 & -8 \ 10 : 48 \left(-\frac{2}{8}\right) \\ 0 & -3 \ 5 : 23 \end{aligned}$$

$$\begin{aligned} 1 & 2 \ -2 : -13 \\ 0 & -8 \ 10 : 48 \\ 0 & 0 \ 1.25 : 5 \end{aligned}$$

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

# Assignment #16

$$8) \begin{cases} x + y + z = 7 \\ 2x + 3y + z = 7 \\ 3x + 2y - z = -12 \end{cases}$$

$$1) \begin{bmatrix} 1 & -1 \\ 3 & -1 \end{bmatrix} * \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ -6 \end{bmatrix}$$

Let  $A = \begin{bmatrix} 1 & -1 \\ 3 & -1 \end{bmatrix}$  then

$$[A^{-1}] * [A] * \begin{bmatrix} x \\ y \end{bmatrix} = [A^{-1}] * \begin{bmatrix} 2 \\ -6 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = [A^{-1}] * \begin{bmatrix} 2 \\ -6 \end{bmatrix}$$

The above shows the proper notation that you need to show when you are solving a matrix system completely. Now you should go on and actually find the inverse so you can solve the 2 by 2.

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} * \begin{bmatrix} 1 & -1 \\ 3 & -1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Now get your 2 systems of equations and solve for a,b,c,d which will be the inverse Matrix.

Then finally multiply your inverse by  $\begin{bmatrix} 2 \\ -6 \end{bmatrix}$

2) Now you do on your own completely.

$$\begin{cases} x - y = -1 \\ x + y = 7 \end{cases}$$

Translate into a Matrix First!! Look above. Show all the work. This is an exact problem on the test. You need to show everything