

1. Write the following system of equations as an augmented matrix (read carefully):

Do NOT solve:

$$x_1 + 2x_2 - 3x_3 = 7$$

$$2x_1 - x_2 + 2x_4 = 0$$

$$x_2 - 3x_3 = 5$$

$$\left[ \begin{array}{cccc|c} 1 & 2 & -3 & 0 & 7 \\ 2 & -1 & 0 & 2 & 0 \\ 0 & 1 & -3 & 0 & 5 \end{array} \right]$$

$\bar{x} = 225$   
mod = 39  
no = 27

20

2. Find:  $(3, 2, 4, 5) + 2(1, 2, -2, -3) = (3, 2, 4, 5) + (2, 4, -4, -6) = (5, 6, 0, -1)$

3. Determine the solutions of the systems of equations with the following augmented matrices:

$$\left[ \begin{array}{ccc|c} 2 & 2 & -1 & -6 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 2 & 4 \end{array} \right]$$

$2x_3 = 4 \quad x_2 + 4 = 3 \quad 2x_2 - 2 - 2 = -6$   
 $x_3 = 2 \quad x_2 = -1 \quad 2x_2 = -4 - 2$   
 $x_2 = -3$

$(-3, -1, 2)$

more space

21

mostly small matrix

$$\left[ \begin{array}{ccc|c} 2 & 3 & -1 & -8 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 5 \end{array} \right]$$

no sols

all but 1

$$\left[ \begin{array}{ccc|c} 2 & 4 & -1 & -8 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 2 & 0 \end{array} \right]$$

$2x_3 = 0 \quad x_2 + 0 = 3 \quad 2x_1 + 4(3) - 0 = -8$   
 $x_3 = 0 \quad x_2 = 3 \quad 2x_1 = -20 \quad x_1 = -10$

$(-10, 3, 0)$

21

$$\left[ \begin{array}{cccc|c} 1 & 3 & -1 & -8 & 0 \\ 0 & 2 & 2 & 4 & -6 \\ 0 & 0 & 0 & 5 & 10 \end{array} \right]$$

$5x_4 = 10 \quad x_3 = t \quad 2x_2 + 2t + 8 = -6$   
 $x_4 = 2 \quad 2x_2 = -14 - 2t$   
 $x_2 = -7 - t$

$(4t + 37, -7 - t, t, 2)$

$x_1 + 3(-7 - t) + t + 2 = 0$   
 $x_1 - 21 - 3t + t + 2 = 0$   
 $x_1 = 19 - 2t$   
 $x_1 = 19 - 2(-7 - t) = 19 + 14 + 2t = 33 + 2t$

Final Substn

4. Solve this system of equations by row reduction:

$$\left[ \begin{array}{ccc|c} 1 & 2 & 3 & -4 \\ -2 & -2 & -4 & 6 \\ 0 & 6 & 7 & -6 \end{array} \right]$$

$$\xrightarrow{\text{row reduction}} \left[ \begin{array}{ccc|c} 1 & 2 & 3 & -4 \\ 0 & 2 & 2 & -2 \\ 0 & 6 & 7 & -6 \end{array} \right]$$

too easy

$$\xrightarrow{\text{row reduction}} \left[ \begin{array}{ccc|c} 1 & 2 & 3 & -4 \\ 0 & 2 & 2 & -2 \\ 0 & 0 & 1 & 0 \end{array} \right]$$

16

$x_3 = 0$   
 $2x_2 = -2$   
 $x_2 = -1$

$x_1 - 2 + 0 = -4$   
 $x_1 = -2$

$(-2, -1, 0)$