

## Homework 1.1

1. Solve the given system of equations:

$$\left. \begin{array}{l} x_1 + 5x_2 = 4 \\ 3x_1 + 5x_2 = -8 \end{array} \right\} \rightarrow \text{Solution: } (x_1, x_2) = (-6, 2)$$

2. The point  $(x_1, x_2)$  on the line  $x_1 + 2x_2 = 8$  and on the line  $x_1 - x_2 = 2$  is what?

$$\left. \begin{array}{l} x_1 + 2x_2 = 8 \\ x_1 - x_2 = 2 \end{array} \right\} \rightarrow \text{Solution: } (x_1, x_2) = (4, 2)$$

3. The augmented matrix of a linear system has been reduced by row operations to the form shown. Continue the appropriate row operations and describe the solution set of the original system.

$$\left[ \begin{array}{cccc} 0 & 0 & 0 & -1 \\ 0 & 1 & -1 & 4 \\ 0 & 0 & 1 & 2 \\ 1 & 8 & 3 & -4 \end{array} \right] \rightarrow \text{Solution: Solution set is empty.}$$

4. The augmented matrix of a linear system has been reduced by row operations to the form shown. Continue the appropriate row operations and describe the solution set of the original system.

$$\left[ \begin{array}{cccc} 1 & -2 & 7 & 0 \\ 0 & 1 & 6 & 0 \\ 0 & 0 & 1 & 0 \end{array} \right] \rightarrow \text{Solution: There is only one solution, } (0, 0, 0).$$

5. The augmented matrix of a linear system has been reduced by row operations to the form shown. Continue the appropriate row operations and describe the solution set of the original system.

$$\left[ \begin{array}{ccccc} 1 & -1 & 0 & 0 & -4 \\ 0 & 1 & -3 & 0 & -7 \\ 0 & 0 & 1 & -2 & 4 \\ 0 & 0 & 0 & 1 & 3 \end{array} \right] \rightarrow \text{Solution: There is only one solution, } (19, 23, 10, 3).$$

6. Solve the given system of equations:

$$\left. \begin{array}{l} x_1 - 3x_3 = 12 \\ 2x_1 + 2x_2 + 9x_3 = -15 \\ x_2 + 4x_3 = -9 \end{array} \right\} \rightarrow \text{Solution: } (x_1, x_2, x_3) = (3, 3, -3)$$

7. Determine if the given system is consistent:

$$\left. \begin{array}{l} 3x_1 + 6x_3 = 12 \\ x_2 - 3x_4 = 3 \\ -5x_1 + 6x_3 + 2x_4 = 2 \\ 6x_1 + 7x_4 = -2 \end{array} \right\} \rightarrow \text{Solution: The system is consistent because the system can be reduced to a triangular form that indicates a solution exists.}$$