

Review Exercise Set 19

Exercise 1: Write the augmented matrix for the given system of equations.

$$-2x + 4y - 3z = 4$$

$$5x - 6y + 7z = 12$$

$$x + 2y + z = -4$$

Exercise 2: Write the system of linear equations represented in the given augmented matrix.

$$\left[\begin{array}{ccc|c} 1 & 3 & 0 & 2 \\ -2 & 4 & 1 & 1 \\ 3 & -1 & -2 & 9 \end{array} \right]$$

Exercise 3: Perform the row operation, $-5R_1 + R_2 \rightarrow R_2$, for the given augmented matrix.

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

Exercise 4: Perform the row operation, $-3R_1 + 2R_2 \rightarrow R_2$, for the given augmented matrix.

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

Exercise 5: Solve the given system of equations using Gauss-Jordan elimination.

$$-x + 2y + 3z = -6$$

$$x - y + 2z = -4$$

$$3x + y - z = 2$$

Review Exercise Set 19 Answer Key

Exercise 1: Write the augmented matrix for the given system of equations.

$$\begin{aligned} -2x + 4y - 3z &= 4 \\ 5x - 6y + 7z &= 12 \\ x + 2y + z &= -4 \end{aligned}$$

$$\left[\begin{array}{ccc|c} -2 & 4 & -3 & 4 \\ 5 & -6 & 7 & 12 \\ 1 & 2 & 1 & -4 \end{array} \right]$$

Exercise 2: Write the system of linear equations represented in the given augmented matrix.

$$\left[\begin{array}{ccc|c} 1 & 3 & 0 & 2 \\ -2 & 4 & 1 & 1 \\ 3 & -1 & -2 & 9 \end{array} \right]$$

$$\begin{aligned} x + 3y &= 2 \\ -2x + 4y + z &= 1 \\ 3x - y - 2z &= 9 \end{aligned}$$

Exercise 3: Perform the row operation, $-5R_1 + R_2 \rightarrow R_2$, for the given augmented matrix.

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

$$\begin{aligned} -5R_1 + R_2 &= -5[1 \ -3 \ 3 \ 2] + [5 \ 8 \ 3 \ -5] \\ -5R_1 + R_2 &= [-5 \ 15 \ -15 \ -10] + [5 \ 8 \ 3 \ -5] \\ -5R_1 + R_2 &= [(-5 + 5) \ (15 + 8) \ (-15 + 3) \ (-10 + (-5))] \\ -5R_1 + R_2 &= [0 \ 23 \ -12 \ -15] \end{aligned}$$

$$\left[\begin{array}{ccc|c} 1 & -3 & 3 & 2 \\ 0 & 23 & -12 & -15 \\ -2 & 1 & 0 & 4 \end{array} \right]$$

Exercise 4: Perform the row operation, $-3R_1 + 2R_2 \rightarrow R_2$, for the given augmented matrix.

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

$$-3R_1 + 2R_2 = -3[2 \ 1 \ -1 \ -3] + 2[3 \ 1 \ 1 \ 0]$$

$$-3R_1 + 2R_2 = [-6 \ -3 \ 3 \ 9] + [6 \ 2 \ 2 \ 0]$$

$$-3R_1 + 2R_2 = [(-6 + 6) \ (-3 + 2) \ (3 + 2) \ (9 + 0)]$$

$$-3R_1 + 2R_2 = [0 \ -1 \ 5 \ 9]$$

$$\left[\begin{array}{ccc|c} 2 & 1 & -1 & -3 \\ 0 & -1 & 5 & 9 \\ 4 & 3 & 2 & 3 \end{array} \right]$$

Exercise 5: Solve the given system of equations using Gauss-Jordan elimination.

$$-x + 2y + 3z = -6$$

$$x - y + 2z = -4$$

$$3x + y - z = 2$$

Setup the augmented matrix

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

Begin row operations to reduce the matrix

$$\left[\begin{array}{ccc|c} 1 & -1 & 2 & -4 \\ -1 & 2 & 3 & -6 \\ 3 & 1 & -1 & 2 \end{array} \right] R_1 \leftrightarrow R_2$$

$$\left[\begin{array}{ccc|c} 1 & -1 & 2 & -4 \\ 0 & 1 & 5 & -10 \\ 3 & 1 & -1 & 2 \end{array} \right] R_1 + R_2 \rightarrow R_2$$

$$\left[\begin{array}{ccc|c} 1 & -1 & 2 & -4 \\ 0 & 1 & 5 & -10 \\ 0 & 4 & -7 & 14 \end{array} \right] -3R_1 + R_3 \rightarrow R_3$$

Exercise 5 (Continued):

$$\left[\begin{array}{ccc|c} 1 & 0 & 7 & -14 \\ 0 & 1 & 5 & -10 \\ 0 & 4 & -7 & 14 \end{array} \right] R_2 + R_1 \rightarrow R_1$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 7 & -14 \\ 0 & 1 & 5 & -10 \\ 0 & 0 & -27 & 54 \end{array} \right] -4R_2 + R_3 \rightarrow R_3$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 7 & -14 \\ 0 & 1 & 5 & -10 \\ 0 & 0 & 1 & -2 \end{array} \right] R_3 \div -27 \rightarrow R_3$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 5 & -10 \\ 0 & 0 & 1 & -2 \end{array} \right] -7R_3 + R_1 \rightarrow R_1$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & -2 \end{array} \right] -5R_3 + R_2 \rightarrow R_2$$

The solution set (x, y, z) is $(0, 0, -2)$.