Ch. 11 Review.

Name: Key Per:

1. Solve the system $\begin{cases} x+y-z=5 \\ 2x+y+3z=2 \\ 4x-y+2z=-1 \end{cases}$, using reduced row echelon form.

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 5 \\ 2 & 1 & 3 & 2 \\ 4 & -1 & 2 & -1 \end{array}\right] \rightarrow \left[\begin{array}{ccc|c} 1 & 1 & -1 & 5 \\ 0 & -1 & 5 & -8 \\ 4 & -1 & 2 & -1 \end{array}\right] \rightarrow \left[\begin{array}{ccc|c} 1 & 1 & -1 & 5 \\ 0 & -1 & 5 & -8 \\ 0 & -5 & 6 & -21 \end{array}\right]$$

$$\rightarrow \left[\begin{array}{ccc|c} 1 & 1 & -1 & 5 \\ 0 & 1 & -5 & 8 \\ 0 & -5 & 6 & -21 \end{array}\right] \rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 4 & -3 \\ 0 & 1 & -5 & 8 \\ 0 & -5 & 6 & -21 \end{array}\right] \rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 4 & -3 \\ 0 & 1 & -5 & 8 \\ 0 & 0 & -19 & 19 \end{array}\right]$$

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

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

solution

$(1, 3, -1)$

2 Solve each system of equations using inverse matrices. Show your matrix equations, to find the inverses of matrices.

$-3x+7y=-16$ $-15 - {}^{-}63$

$-9x+5y=16$

$$\frac{1}{-48}\begin{vmatrix}5 & -7\\ 9 & -3\end{vmatrix} = \begin{bmatrix}\frac{5}{48} & \frac{-7}{48}\\ \frac{9}{48} & \frac{-3}{48}\end{bmatrix} \cdot \begin{bmatrix}-16\\ 16\end{bmatrix} = \begin{bmatrix}\frac{-5}{3} + \frac{-7}{3}\\ -3 + {}^{-}1\end{bmatrix}$$

2x2 2x1

$$\begin{bmatrix}-4\\ -4\end{bmatrix}$$

solution

(-4, -4)

3 . Solve the system of equations by substitution. or elimination

$$2\left(5x-2y=-1\right) \rightarrow 10x - 4y = -2$$

$x+4y=35$ $x + 4y = 35$

$11x = 33$

$x = 3$

$3+4y=35$

$4y=32$

$y=8$

solution

$\boxed{(3, 8)}$

4. Let $A = \begin{bmatrix} -3 & 4 \\ 0 & 2 \end{bmatrix}$. Find 2A.

$$\begin{bmatrix} -6 & 8 \\ 0 & 4 \end{bmatrix}$$

5. Let $A = \begin{bmatrix} -1 & 0 \\ 6 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 6 \\ 3 & 1 \end{bmatrix}$. Find A - B.

$$\begin{bmatrix} 0 & -6 \\ 3 & 2 \end{bmatrix}$$

6. Let $A = \begin{bmatrix} -3 & 1 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 2 \\ 5 & -2 \end{bmatrix}$. Find A + B.

$$\begin{bmatrix} 3 & 3 \\ 7 & 3 \end{bmatrix}$$

Find the product AB, if possible.

7. $\overset{2\times 2}{A = \begin{bmatrix} -1 & 3 \\ 3 & 2 \end{bmatrix}}$, $\overset{2\times 2}{B = \begin{bmatrix} -2 & 0 \\ -1 & 1 \end{bmatrix}}$

$$\begin{bmatrix} 2+-3 & 0+3 \\ -6+-2 & 0+2 \end{bmatrix} = \begin{bmatrix} -1 & 3 \\ -8 & 2 \end{bmatrix}$$

Find the inverse each matrix. If it does not have an inverse state why not.

9. $\begin{bmatrix} 11 & -5 \\ 2 & -1 \end{bmatrix} \Rightarrow \text{Det} = -11 - {}^-10 = -1$

$\frac{1}{-1}\begin{bmatrix} -1 & 5 \\ -2 & 11 \end{bmatrix} = \begin{bmatrix} 1 & -5 \\ 2 & -11 \end{bmatrix}$

___10. Solve the system of equations using Crámer's Rule if it is applicable. If Cramer's Rule is not applicable, say so.

$$\begin{cases} 4x + 2y = \frac{8}{3} \\ 3x - 3y = 3 \end{cases}$$

$$\frac{D_x}{D} = \frac{\begin{vmatrix} \frac{8}{3} & 2 \\ 3 & -3 \end{vmatrix}}{\begin{vmatrix} 4 & 2 \\ 3 & -3 \end{vmatrix}} = \frac{-8 - 6}{-12 - 6} = \frac{-14}{-18} = \frac{7}{9}$$

$$\frac{D_y}{D} = \frac{\begin{vmatrix} 4 & \frac{8}{3} \\ 3 & 3 \end{vmatrix}}{\begin{vmatrix} 4 & 2 \\ 3 & -3 \end{vmatrix}} = \frac{12 - 8}{-12 - 6} = \frac{4}{-18} = \frac{-2}{9}$$

solution

$\left(\frac{7}{9}, \frac{-2}{9}\right)$