

Given the following matrices, simplify the expressions, using fractions instead of decimals.

$$A = \begin{bmatrix} 7 & -2 \\ -1 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & 7 \\ -2 & 4 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & -5 \\ -3 & 2 \end{bmatrix}$$

$$D = \begin{bmatrix} 2 & -3 & 1 \\ 4 & 2 & -1 \\ -2 & 3 & -3 \end{bmatrix}$$

$$E = \begin{bmatrix} 4 & 3 & 1 \\ -2 & -1 & -1 \end{bmatrix}$$

$$F = \begin{bmatrix} 6 & 5 & -2 \\ 2 & 4 & -1 \\ 3 & 1 & 4 \end{bmatrix}$$

1. $A + 2B - 3C = \begin{bmatrix} 10 & 27 \\ 4 & 2 \end{bmatrix}$

2. $-2(FD) = \begin{bmatrix} -72 & 28 & -14 \\ -44 & 2 & -2 \\ -4 & -10 & 20 \end{bmatrix}$

3. $A^2 = \begin{bmatrix} 51 & -14 \\ -7 & 2 \end{bmatrix}$

4. $\frac{1}{2}(AB) - 2(BC) = \begin{bmatrix} 9\frac{1}{2} & 45\frac{1}{2} \\ 53\frac{1}{2} & -79\frac{1}{2} \end{bmatrix}$

5. $(A + B)C = \begin{bmatrix} -130 & -65 \\ 39 & -52 \end{bmatrix}$

6. $|C| + |D| = -45$

7. $C^{-1} = \begin{bmatrix} -2/13 & -5/13 \\ -3/13 & -1/13 \end{bmatrix}$

8. $D^{-1} = \begin{bmatrix} 3/32 & 3/16 & -1/32 \\ -7/16 & 1/8 & -3/16 \\ -1/2 & 0 & -1/2 \end{bmatrix}$

9. $F \cdot F^{-1} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

10. $3D - F = \begin{bmatrix} 0 & -14 & 5 \\ 10 & 2 & -2 \\ -9 & 8 & -13 \end{bmatrix}$

Write each system as a matrix equation and then solve.

11. $\begin{cases} 3x + 2y = -5 \\ 4x = 2y + 10 \end{cases} \Rightarrow \begin{bmatrix} 3 & 2 \\ 4 & -2 \end{bmatrix}^{-1} \begin{bmatrix} -5 \\ 10 \end{bmatrix} = \begin{pmatrix} 5 \\ -25 \\ 7 \\ 7 \end{pmatrix}$

$$\begin{cases} 3x + 2y = -5 \\ 4x - 2y = 10 \end{cases}$$

13. $\begin{cases} -4 + y + z = x \\ -x + 2y - 3z = -6 \\ 2x - 4y + 8z = 18 \end{cases} \Rightarrow \begin{bmatrix} -1 & 1 & 1 \\ -1 & 2 & -3 \\ 2 & -4 & 8 \end{bmatrix}^{-1} \begin{bmatrix} 4 \\ -6 \\ 18 \end{bmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

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

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

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

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

$$2x - 4y + 8z = 18$$

$$2x - 4y + 8z = 18$$

12. $\begin{cases} 6x + 2 = y \\ -18x + 3y = 4 \end{cases} \Rightarrow \begin{bmatrix} 6 & -1 \\ -18 & 3 \end{bmatrix} \begin{bmatrix} -2 \\ 4 \end{bmatrix} = \emptyset$

$$\begin{cases} 6x - y = -2 \\ -18x + 3y = 4 \end{cases}$$

14. $\begin{cases} 5x + 3y + 2z = 1 \\ x - 2y - 2 = -z \\ -5x - 2y + 2z = 11 \end{cases} \Rightarrow \begin{bmatrix} 5 & 3 & 2 \\ 1 & -2 & 1 \\ -5 & -2 & 2 \end{bmatrix}^{-1} \begin{bmatrix} 1 \\ 2 \\ 11 \end{bmatrix} = \begin{pmatrix} -1 \\ 0 \\ 3 \end{pmatrix}$

$$5x + 3y + 2z = 1$$

$$5x + 3y + 2z = 1$$

$$x - 2y - 2 = -z$$

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

$$-5x - 2y + 2z = 11$$

$$-5x - 2y + 2z = 11$$

