Name _____ Class _____ Date _____

Form G

12-4 Practice

Inverse Matrices and Systems

Solve each matrix equation. If an equation cannot be solved, explain why.

1. $\begin{bmatrix} 0.25 & -0.75 \\ 3.5 & 2.25 \end{bmatrix} X = \begin{bmatrix} 1.5 \\ -3.75 \end{bmatrix}$

2. $\begin{bmatrix} 3 & -9 \\ 1 & -6 \end{bmatrix} X = \begin{bmatrix} 12 \\ 0 \end{bmatrix}$

3. $\begin{bmatrix} 3 & -6 \\ -1 & 2 \end{bmatrix} X = \begin{bmatrix} 4 \\ 9 \end{bmatrix}$

4. $\begin{bmatrix} 1 & 0 & -1 \\ 3 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix} X = \begin{bmatrix} 2 \\ 2 \\ -2 \end{bmatrix}$

Write each system as a matrix equation. Identify the coefficient matrix, the variable matrix, and the constant matrix.

5. $\begin{cases} 6x + 9y = 36 \\ 4x + 13y = 2 \end{cases}$

6. $\begin{cases} 3x - 4y = -9 \\ 7y = 24 \end{cases}$

7. $\begin{cases} 3a = 5 \\ b = 12 + a \end{cases}$

8. $\begin{cases} 4x - z = 9 \\ 12x + 2y = 17 \\ x - y + 12z = 3 \end{cases}$

Solve each system of equations using a matrix equation. Check your answers.

9. $\begin{cases} x + 3y = 5 \\ x + 4y = 6 \end{cases}$

10. $\begin{cases} 2x + 3y = 12 \\ x + 2y = 7 \end{cases}$

11. $\begin{cases} x - 3y = -1 \\ -6x + 19y = 6 \end{cases}$

12. $\begin{cases} 4x - 3y = 55 \\ x + y = 5 \end{cases}$

13. $\begin{cases} 6x + 7y = -12 \\ 3x - 4y = -6 \end{cases}$

14. $\begin{cases} 3x - y = 6 \\ -2x + 3y = 10 \end{cases}$

15. $\begin{cases} -3x + 4y - z = -5 \\ x - y - z = -8 \\ 2x + y + 2z = 9 \end{cases}$

16. $\begin{cases} x + y + z = 31 \\ x - y + z = 1 \\ x - 2y + 2z = 7 \end{cases}$

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

18. $\begin{cases} 3x - 2y + 4z = -10 \\ y - 3z = 1 \\ 2x + z = -3 \end{cases}$

12-4 Practice (continued)

Form G

Inverse Matrices and Systems

19. An apartment building has 50 units. All have one or two bedrooms. One-bedroom units rent for \$425/mo. Two-bedroom units rent for \$550/mo. When all units are occupied, the total monthly rent collected is \$25,000. How many units of each type are in the building?

20. The difference between twice Bill's age and Carlos's age is 26. The sum of Anna's age, three times Bill's age, and Carlos's age is 92. The total of the three ages is 52.
    a. Write a matrix equation to represent this situation.
    b. How old is each person?

Solve each system.

21. $\begin{cases} x + 2y - 3z = 18 \\ -3x - z = -20 \\ y + 3z = -13 \end{cases}$

22. $\begin{cases} x + y + 3z = 9 \\ 2y - 5z = -21 \\ 2x - 5y = 21 \end{cases}$

23. $\begin{cases} w + 2x - 3y + z = -2 \\ 2w - x - y + 3z = 3 \\ -w + 3x + y - z = 0 \\ 3w - x - 2y + 2z = -1 \end{cases}$

24. $\begin{cases} 2w + 3x - y + z = -11 \\ w + x + y + z = 0 \\ -3w - 2x - y - z = -3 \\ -2w + x + 3y + 2z = -5 \end{cases}$

Solve each matrix equation. If the coefficient matrix has no inverse, write *no unique solution.*

25. $\begin{bmatrix} 12 & -3 \\ 16 & 4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 144 \\ -64 \end{bmatrix}$

26. $\begin{bmatrix} 3 & 1 \\ 12 & 4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ 10 \end{bmatrix}$

Determine whether each system has a unique solution.

27. $\begin{cases} 4d + 2e = 4 \\ d + 3e = 6 \end{cases}$

28. $\begin{cases} 3x - 2y = 43 \\ 9x - 6y = 40 \end{cases}$

29. $\begin{cases} -y - z = 3 \\ x + 2y + 3z = 1 \\ 4x - 5y - 6z = -50 \end{cases}$

30. **Reasoning** Explain how you could use a matrix equation to show that the lines represented by $y = -3x + 4$ and $y = -4x - 8$ intersect.