

Practice 4-7

Inverse Matrices and Systems

Solve each system.

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| <p>1. $\begin{cases} x + y + z = 0.621 \\ 3x - 3y + 2z = -0.007 \\ 4x + 5y - 10z = 1.804 \end{cases}$</p> | <p>2. $\begin{cases} 3x + 4y + 2z = 0.5 \\ 8x - 5y - 5z = 8.1 \\ 5x + 5y + 5z = 1 \end{cases}$</p> | <p>3. $\begin{cases} 5x - 4y + 3z = -30 \\ 18x - 2y - 19z = 103 \\ 2.9x + 0.06y + 17z = -81.8 \end{cases}$</p> |
| <p>4. $\begin{cases} x + 3y = 5 \\ x + 4y = 6 \end{cases}$</p> | <p>5. $\begin{cases} 4x + y + z = 0 \\ 5x + 2y + 3z = -15 \\ 6x - 5y - 5z = 52 \end{cases}$</p> | <p>6. $\begin{cases} 2x + 3y = 12 \\ x + 2y = 7 \end{cases}$</p> |
| <p>7. $\begin{cases} x + y + z = 31 \\ x - y + z = 1 \\ x - 2y + 2z = 7 \end{cases}$</p> | <p>8. $\begin{cases} x - 3y = -1 \\ -6x + 19y = 6 \end{cases}$</p> | <p>9. $\begin{cases} x + y + z = 8.8 \\ 2x - 5y + 9z = -4.8 \\ 3x + 2y - 7z = -7.6 \end{cases}$</p> |
| <p>10. $\begin{cases} -3x + 4y = 2 \\ x - y = -1 \end{cases}$</p> | <p>11. $\begin{cases} 0.5x + 1.5y + z = 7 \\ 3x + 3y + 5z = 3 \\ 2x + y + 2z = -1 \end{cases}$</p> | <p>12. $\begin{cases} x + y + z = -2 \\ 1.5x + 3y + 0.5z = 8 \\ 9x + 4y + 5z = 4 \end{cases}$</p> |

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

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| <p>13. $\begin{cases} 6x + 9y = 36 \\ 4x + 13y = 2 \end{cases}$</p> | <p>14. $\begin{cases} 3x - 4y = -9 \\ 7y = 24 \end{cases}$</p> | <p>15. $\begin{cases} 4x - z = 9 \\ 12x + 2y = 17 \\ x - y + 12z = 3 \end{cases}$</p> |
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Write a system of equations. Solve the system using an inverse matrix.

16. In 1992, there were 548,303 doctors under the age of 65 in the United States. Of those under age 45, 25.53415% were women. Of those between the ages of 45 and 64, 11.67209% were women. There were 110,017 women doctors under the age of 65. How many doctors were under age 45?
17. An apartment building has 50 units. All are one- or two-bedroom units. One-bedroom units rent for \$425/mo, and two-bedroom units rent for \$550/mo. When all units are occupied, the total monthly income is \$25,000. How many apartments of each type are there?

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

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| <p>18. $\begin{bmatrix} 0.25 & -0.75 \\ 3.5 & 2.25 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1.5 \\ -3.75 \end{bmatrix}$</p> | <p>19. $\begin{bmatrix} 3 & -9 \\ 1 & -6 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 12 \\ 0 \end{bmatrix}$</p> |
| <p>20. $\begin{bmatrix} 3 & -6 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} u \\ v \end{bmatrix} = \begin{bmatrix} 4 \\ 9 \end{bmatrix}$</p> | <p>21. $\begin{bmatrix} 12 & -3 \\ 16 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 144 \\ -64 \end{bmatrix}$</p> |

Determine whether each system has a unique solution.

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| <p>22. $\begin{cases} 4d + 2e = 4 \\ d + 3e = 6 \end{cases}$</p> | <p>23. $\begin{cases} 3x - 2y = 43 \\ 9x - 6y = 40 \end{cases}$</p> | <p>24. $\begin{cases} -y - z = 3 \\ x + 2y + 3z = 1 \\ 4x - 5y - 6z = -50 \end{cases}$</p> |
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