Answer Key

Unit 1 Matrices

Inverse and Identity Matrices
Solving Equations using Inverses

You must show all work for 2x2 matrices.

Inverse Matrices

For each matrix state if an inverse exists.

1) $\begin{bmatrix} -9 & -9 \\ -2 & -2 \end{bmatrix}$ No; det = 0

2) $\begin{bmatrix} -2 & 1 \\ -6 & 1 \end{bmatrix}$ Yes; det = 4

3) $\begin{bmatrix} 4 & -5 \\ -9 & 6 \end{bmatrix}$ Yes; det = 21

4) $\begin{bmatrix} 0 & 0 \\ -6 & 4 \end{bmatrix}$ No; det = 0

Find the inverse of each matrix.

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

6) $\begin{bmatrix} 0 & -2 \\ -1 & -9 \end{bmatrix}$ $\begin{bmatrix} \frac{9}{2} & -1 \\ -\frac{1}{2} & 0 \end{bmatrix}$

7) $\begin{bmatrix} -1 & 7 \\ -1 & 7 \end{bmatrix}$ The inverse does not exist since det = 0.

8) $\begin{bmatrix} 1 & -1 \\ -6 & -3 \end{bmatrix}$ $\begin{bmatrix} \frac{1}{3} & -\frac{1}{9} \\ -\frac{2}{3} & -\frac{1}{9} \end{bmatrix}$

9) $\begin{bmatrix} 1 & -8 \\ 1 & -5 \end{bmatrix}$ $\begin{bmatrix} -\frac{5}{3} & \frac{8}{3} \\ -\frac{1}{3} & \frac{1}{3} \end{bmatrix}$

10) $\begin{bmatrix} -6 & 6 \\ 3 & -3 \end{bmatrix}$ No inverse; det = 0.

11) $\begin{bmatrix} 6 & 1 & 0 \\ -2 & -2 & 2 \\ -5 & 0 & 0 \end{bmatrix}$ $\begin{bmatrix} 0 & 0 & -\frac{1}{5} \\ -1 & 0 & \frac{6}{5} \\ 1 & \frac{1}{2} & 1 \end{bmatrix}$

12) $\begin{bmatrix} -2 & -2 & -2 \\ 0 & 2 & 4 \\ 2 & 5 & 6 \end{bmatrix}$ $\begin{bmatrix} -1 & \frac{1}{4} & -\frac{1}{2} \\ 1 & -1 & 1 \\ -\frac{1}{2} & \frac{3}{4} & -\frac{1}{2} \end{bmatrix}$

Solve each system, if possible, using inverse matrices.

13) $2x - 4y = 26$
$3x + 6y = -21$
(3, −5)

14) $4x + 3y = 12$
$2x + 4y = -4$
(6, −4)

15) $-6x - 4y - 3z = 6$
$-3x + 2y - 6z = -9$
$2x + y = -1$
(1, −3, 0)

16) $3x + z = -5$
$6x - y + 2z = -9$
$-2x + 3y + 3z = 4$
(−2, −1, 1)

17) $-x + 3y = -15$
$2x - 3y - z = 23$
$-3x - 3y + 5z = -22$
(3, −4, −5)

18) $2x + 4y - 3z = -17$
$3x - 4y + 2z = 8$
$-6x - 4y + z = 27$
(−2, −4, −1)