

Matrix Inverses and Determinants**Evaluate each determinant.**

1) $\begin{vmatrix} -1 & 2 \\ 1 & -4 \end{vmatrix}$

2) $\begin{vmatrix} 3 & 5 \\ -5 & -2 \end{vmatrix}$

3) $\begin{vmatrix} -4 & 4 \\ -5 & -3 \end{vmatrix}$

4) $\begin{vmatrix} -2 & 3 \\ 0 & 5 \end{vmatrix}$

5) $\begin{vmatrix} -5 & 2 & 1 \\ 1 & 0 & 0 \\ 0 & 4 & 0 \end{vmatrix}$

6) $\begin{vmatrix} -5 & -4 & 1 \\ -3 & 0 & 5 \\ -1 & 0 & 3 \end{vmatrix}$

7) $\begin{vmatrix} 3 & 3 & 1 \\ -3 & -1 & -3 \\ -4 & -3 & 1 \end{vmatrix}$

8) $\begin{vmatrix} -2 & 1 & -2 \\ 0 & 5 & -5 \\ 0 & 2 & -5 \end{vmatrix}$

For each matrix state if an inverse exists.

9) $\begin{bmatrix} 10 & -1 \\ 0 & 0 \end{bmatrix}$

10) $\begin{bmatrix} -10 & 5 \\ -2 & -1 \end{bmatrix}$

Find the inverse of each matrix.

$$11) \begin{bmatrix} -3 & 1 \\ 9 & -1 \end{bmatrix}$$

$$12) \begin{bmatrix} -3 & -3 \\ -4 & -3 \end{bmatrix}$$

$$13) \begin{bmatrix} -4 & 0 \\ -8 & -1 \end{bmatrix}$$

$$14) \begin{bmatrix} 3 & -1 \\ -2 & 4 \end{bmatrix}$$

For each matrix state if an inverse exists.

$$15) \begin{bmatrix} 2 & -2 & 5 \\ -2 & 3 & -2 \\ 3 & -6 & -4 \end{bmatrix}$$

$$16) \begin{bmatrix} 2 & -1 & 3 \\ 1 & -1 & -3 \\ -2 & 0 & -4 \end{bmatrix}$$

Find the inverse of each matrix.

$$17) \begin{bmatrix} -2 & 5 & -2 \\ -2 & 2 & 0 \\ -3 & -2 & 2 \end{bmatrix}$$

$$18) \begin{bmatrix} 1 & 1 & -2 \\ -3 & -2 & 5 \\ -6 & 4 & 4 \end{bmatrix}$$

Critical thinking questions:

19) For what value(s) of x does the matrix M have an inverse?

$$M = \begin{bmatrix} x & 1 \\ 2 & x + 1 \end{bmatrix}$$

20) Give an example of a 3×3 matrix that has a determinant of 1.

Matrix Inverses and Determinants**Evaluate each determinant.**

1)
$$\begin{vmatrix} -1 & 2 \\ 1 & -4 \end{vmatrix}$$

2

2)
$$\begin{vmatrix} 3 & 5 \\ -5 & -2 \end{vmatrix}$$

19

3)
$$\begin{vmatrix} -4 & 4 \\ -5 & -3 \end{vmatrix}$$

32

4)
$$\begin{vmatrix} -2 & 3 \\ 0 & 5 \end{vmatrix}$$

-10

5)
$$\begin{vmatrix} -5 & 2 & 1 \\ 1 & 0 & 0 \\ 0 & 4 & 0 \end{vmatrix}$$

4

6)
$$\begin{vmatrix} -5 & -4 & 1 \\ -3 & 0 & 5 \\ -1 & 0 & 3 \end{vmatrix}$$

-16

7)
$$\begin{vmatrix} 3 & 3 & 1 \\ -3 & -1 & -3 \\ -4 & -3 & 1 \end{vmatrix}$$

20

8)
$$\begin{vmatrix} -2 & 1 & -2 \\ 0 & 5 & -5 \\ 0 & 2 & -5 \end{vmatrix}$$

30

For each matrix state if an inverse exists.

9)
$$\begin{bmatrix} 10 & -1 \\ 0 & 0 \end{bmatrix}$$

No

10)
$$\begin{bmatrix} -10 & 5 \\ -2 & -1 \end{bmatrix}$$

Yes

Find the inverse of each matrix.

$$11) \begin{bmatrix} -3 & 1 \\ 9 & -1 \end{bmatrix}$$

$$-\frac{1}{6} \cdot \begin{bmatrix} -1 & -1 \\ -9 & -3 \end{bmatrix}$$

$$12) \begin{bmatrix} -3 & -3 \\ -4 & -3 \end{bmatrix}$$

$$-\frac{1}{3} \cdot \begin{bmatrix} -3 & 3 \\ 4 & -3 \end{bmatrix}$$

$$13) \begin{bmatrix} -4 & 0 \\ -8 & -1 \end{bmatrix}$$

$$\frac{1}{4} \cdot \begin{bmatrix} -1 & 0 \\ 8 & -4 \end{bmatrix}$$

$$14) \begin{bmatrix} 3 & -1 \\ -2 & 4 \end{bmatrix}$$

$$\frac{1}{10} \cdot \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$$

For each matrix state if an inverse exists.

$$15) \begin{bmatrix} 2 & -2 & 5 \\ -2 & 3 & -2 \\ 3 & -6 & -4 \end{bmatrix}$$

Yes

$$16) \begin{bmatrix} 2 & -1 & 3 \\ 1 & -1 & -3 \\ -2 & 0 & -4 \end{bmatrix}$$

Yes

Find the inverse of each matrix.

$$17) \begin{bmatrix} -2 & 5 & -2 \\ -2 & 2 & 0 \\ -3 & -2 & 2 \end{bmatrix}$$

$$-\frac{1}{8} \cdot \begin{bmatrix} 4 & -6 & 4 \\ 4 & -10 & 4 \\ 10 & -19 & 6 \end{bmatrix}$$

$$18) \begin{bmatrix} 1 & 1 & -2 \\ -3 & -2 & 5 \\ -6 & 4 & 4 \end{bmatrix}$$

$$\frac{1}{2} \cdot \begin{bmatrix} -28 & -12 & 1 \\ -18 & -8 & 1 \\ -24 & -10 & 1 \end{bmatrix}$$

Critical thinking questions:

19) For what value(s) of x does the matrix M have an inverse?

$$M = \begin{bmatrix} x & 1 \\ 2 & x+1 \end{bmatrix}$$

All values except 1 and -2

20) Give an example of a 3×3 matrix that has a determinant of 1.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$