

Determinants

Name Key

Evaluate the determinant of the matrix.

1.  $\begin{bmatrix} -4 & 2 \\ 8 & 0 \end{bmatrix}$   $\begin{matrix} 0-16 \\ -16 \end{matrix}$     2.  $\begin{bmatrix} 1 & 4 \\ 5 & 1 \end{bmatrix}$   $\begin{matrix} 1-20 \\ -19 \end{matrix}$     3.  $\begin{bmatrix} -6 & 5 \\ 8 & 10 \end{bmatrix}$   $\begin{matrix} -60-40 \\ -100 \end{matrix}$     4.  $\begin{bmatrix} 5 & 9 \\ 8 & 1 \end{bmatrix}$   $\begin{matrix} 5-72 \\ -67 \end{matrix}$

5.  $\begin{bmatrix} 7 & -7 \\ 11 & 4 \end{bmatrix}$   $\begin{matrix} 28-77 \\ 105 \end{matrix}$     6.  $\begin{bmatrix} 1 & 3 \\ -2 & -6 \end{bmatrix}$   $\begin{matrix} -6-18 \\ 0 \end{matrix}$     7.  $\begin{bmatrix} 4 & 6 \\ 9 & 11 \end{bmatrix}$   $\begin{matrix} 44-54 \\ -10 \end{matrix}$     8.  $\begin{bmatrix} 0 & 3 \\ -2 & 9 \end{bmatrix}$   $\begin{matrix} 0+16 \\ 6 \end{matrix}$

Evaluate the determinant of the matrix by using diagonals.

9.  $\begin{bmatrix} 3 & 2 & -5 \\ 6 & 0 & -1 \\ 0 & -1 & 3 \end{bmatrix}$     10.  $\begin{bmatrix} -1 & 2 & 7 \\ 2 & -1 & -1 \\ 3 & 5 & 2 \end{bmatrix}$     11.  $\begin{bmatrix} 1 & 2 & 1 \\ 6 & 5 & 0 \\ 1 & 4 & -2 \end{bmatrix}$     12.  $\begin{bmatrix} 3 & 12 & 1 \\ -10 & 9 & 8 \\ -5 & 4 & -1 \end{bmatrix}$

13.  $\begin{bmatrix} -4 & 0 & 1 \\ 0 & 8 & 9 \\ 0 & 3 & 7 \end{bmatrix}$     14.  $\begin{bmatrix} 4 & 6 & -3 \\ 0 & 1 & 1 \\ 3 & 9 & 11 \end{bmatrix}$     15.  $\begin{bmatrix} 5 & -3 & 2 \\ 1 & 6 & -3 \\ -2 & 1 & 4 \end{bmatrix}$     16.  $\begin{bmatrix} 8 & 0 & 0 \\ 3 & 2 & 0 \\ 6 & 4 & 2 \end{bmatrix}$

Solve for x.

17.  $\begin{vmatrix} 2 & 6 \\ 1 & x \end{vmatrix} = 2$

18.  $\begin{vmatrix} x & 3 \\ -4 & x \end{vmatrix} = 7x$

19.  $\begin{vmatrix} x & 3 & -1 \\ 2 & 1 & -2 \\ 4 & 1 & x \end{vmatrix} = 10$

20.  $\begin{vmatrix} 2x & 0 & 3 \\ 7 & 5 & -1 \\ 4 & 2 & x \end{vmatrix} = 8x^2 - 3x + 12$

$$\begin{array}{r}
 9. \quad 3 \quad 2 \quad -5 \quad 3 \quad 2 \\
 \quad \quad 6 \quad 0 \quad -1 \quad 6 \quad 0 \\
 \quad \quad 0 \quad -1 \quad 3 \quad 0 \quad -1
 \end{array}
 \quad
 \begin{array}{l}
 (0+0+30) - (0+3+36) \\
 30 - 39 \\
 \boxed{-9}
 \end{array}$$

$$\begin{array}{r}
 10. \quad -1 \quad 2 \quad 7 \quad -1 \quad 2 \\
 \quad \quad 2 \quad -1 \quad -1 \quad 2 \quad -1 \\
 \quad \quad 3 \quad 5 \quad 2 \quad 3 \quad 5
 \end{array}
 \quad
 \begin{array}{l}
 (2-6+70) - (-21+5+8) \\
 66 + +8 \\
 \boxed{74}
 \end{array}$$

$$\begin{array}{r}
 11. \quad 1 \quad 2 \quad 1 \quad 1 \quad 2 \\
 \quad \quad 6 \quad 5 \quad 0 \quad 6 \quad 5 \\
 \quad \quad 1 \quad 4 \quad -2 \quad 1 \quad 4
 \end{array}
 \quad
 \begin{array}{l}
 (-10+0+24) - (5+0+-24) \\
 14 + +19 \\
 \boxed{33}
 \end{array}$$

$$\begin{array}{r}
 12. \quad 3 \quad 12 \quad 1 \quad 3 \quad 12 \\
 \quad \quad -10 \quad 9 \quad 8 \quad -10 \quad 9 \\
 \quad \quad -5 \quad 4 \quad -1 \quad -5 \quad 4
 \end{array}
 \quad
 \begin{array}{l}
 (-27-480-40) - (-45+96+120) \\
 -547 - 171 \\
 \boxed{-718}
 \end{array}$$

$$\begin{array}{r}
 13. \quad -4 \quad 0 \quad 1 \quad -4 \quad 0 \\
 \quad \quad 0 \quad 8 \quad 9 \quad 0 \quad 8 \\
 \quad \quad 0 \quad 3 \quad 7 \quad 0 \quad 3
 \end{array}
 \quad
 \begin{array}{l}
 (-224+0+0) - (0+-108+0) \\
 -224+108 \\
 \boxed{-116}
 \end{array}$$

$$\begin{array}{r}
 14. \quad 4 \quad 6 \quad -3 \quad 4 \quad 6 \\
 \quad \quad 0 \quad 1 \quad 1 \quad 0 \quad 1 \\
 \quad \quad 3 \quad 9 \quad 11 \quad 3 \quad 9
 \end{array}
 \quad
 \begin{array}{l}
 (44+18+0) - (-9+36+0) \\
 62 - 27 \\
 \boxed{35}
 \end{array}$$

$$15. \begin{array}{ccccc} 5 & -3 & 2 & 5 & -3 \\ 1 & 6 & -3 & 1 & 6 \\ -2 & 1 & 4 & -2 & 1 \end{array} \quad (120 - 18 + 2) - (-24 - 15 - 12)$$

$$104 + +51$$

$$\boxed{155}$$

$$16. \begin{array}{ccccc} 8 & 0 & 0 & 8 & 0 \\ 3 & 2 & 0 & 3 & 2 \\ 6 & 4 & 2 & 6 & 4 \end{array} \quad (32 + 0 + 0) - (0 + 0 + 0)$$

$$32 - 0$$

$$\boxed{32}$$

$$17. \begin{vmatrix} 2 & 4 \\ 1 & x \end{vmatrix} = 2$$

$$2x - 4 = 2$$

$$2x = 6$$

$$\boxed{x = 3}$$

$$18. \begin{vmatrix} x & 3 \\ -4 & x \end{vmatrix} = -7x$$

$$x^2 - -12 = 7x$$

$$x^2 - 7x + 12 = 0$$

$$(x-4)(x-3) = 0$$

$$\boxed{x = 4, 3}$$

$$19. \begin{array}{ccccc} x & 3 & -1 & x & 3 \\ 2 & 1 & -2 & 2 & 1 \\ 4 & 1 & x & 4 & 1 \end{array} = 10$$

$$(x^2 - 24 - 2) - (4 - 2x + 6x) = 10$$

$$x^2 - 24 - 2 + 4 + 2x - 6x - 10 = 0$$

$$x^2 - 4x - 32 = 0$$

$$(x-8)(x+4)$$

$$\boxed{x = 8, -4}$$

$$20. \begin{array}{cccccc} 2x & 0 & 3 & 2x & 0 & \\ 7 & 5 & -1 & 7 & 5 & = 8x^2 - 3x + 12 \\ 4 & 2 & x & 4 & 2 & \end{array}$$

$$(10x^2 + 0 + 42) - (60 - 4x + 0) = 8x^2 - 3x + 12$$

$$10x^2 + 42 - 60 + 4x - 8x^2 + 3x - 12 = 0$$

$$2x^2 + 7x - 30 = 0$$

$$(2x - 5)(x + 6)$$

$$x = \frac{5}{2}, -6$$