Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Find each determinant. Use the given variable value when provided. Show your work.

1. det(A)

$$A = \begin{bmatrix} 5 & 5 & -6 \\ -5 & -5 & 5 \\ 5 & 0 & -4 \end{bmatrix}$$

2. det(A)

$$A = \begin{bmatrix} -6 & 3 & 6 \\ -3 & 5 & -5 \\ -3 & -5 & -2 \end{bmatrix}$$

3. det(A)

$$A = \begin{bmatrix} 0 & 2 & 1 \\ -2 & 6 & 1 \\ 1 & 2 & -6 \end{bmatrix}$$

4. det(A)

$$A = \begin{bmatrix} -3 & 3 & 3 \\ -6 & 6 & 0 \\ -2 & 4 & -1 \end{bmatrix}$$

5. det(A)

$$A = \begin{bmatrix} -4 & 3 & 2 \\ 6 & -1 & -2 \\ -3 & 1 & -4 \end{bmatrix}$$

6. det(A)

$$A = \begin{bmatrix} 0 & 4 & 0 \\ 6 & -5 & 3 \\ -2 & 2 & -4 \end{bmatrix}$$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Find each determinant. Use the given variable value when provided. Show your work.

7. D

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

8. D

$$D = \begin{vmatrix} 1 & -4 & 3 \\ 0 & 2 & -6 \\ 2 & 6 & -5 \end{vmatrix}$$

9. D

$$D = \begin{vmatrix} 2 & 4 & -2 \\ 0 & 3 & 2 \\ 4 & -1 & 3 \end{vmatrix}$$

10. D

$$D = \begin{vmatrix} -5 & -4 & 1 \\ -5 & 3 & -5 \\ -1 & 6 & -1 \end{vmatrix}$$

11. D

$$D = \begin{vmatrix} -2 & -1 & 6 \\ -5 & -4 & 1 \\ -3 & 2 & -3 \end{vmatrix}$$

12. D

$$D = \begin{vmatrix} -1 & 2 & -3 \\ 0 & -5 & -5 \\ 2 & 0 & -6 \end{vmatrix}$$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Answer Key

Find each determinant. Use the given variable value when provided. Show your work.

1. det(A)

$$A = \begin{bmatrix} 5 & 5 & -6 \\ -5 & -5 & 5 \\ 5 & 0 & -4 \end{bmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (-5)(-4) - (5)(0) = 20$

$T1 = (5) \times M1 = 100$

$M2 = (-5)(-4) - (5)(5) = -5$

$T2 = -(5) \times M2 = 25$

$M3 = (-5)(0) - (-5)(5) = 25$

$T3 = (-6) \times M3 = -150$

Add the three signed terms.

$\det(A) = T1 + T2 + T3 = -25$

2. det(A)

$$A = \begin{bmatrix} -6 & 3 & 6 \\ -3 & 5 & -5 \\ -3 & -5 & -2 \end{bmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (5)(-2) - (-5)(-5) = -35$

$T1 = (-6) \times M1 = 210$

$M2 = (-3)(-2) - (-5)(-3) = -9$

$T2 = -(3) \times M2 = 27$

$M3 = (-3)(-5) - (5)(-3) = 30$

$T3 = (6) \times M3 = 180$

Add the three signed terms.

$\det(A) = T1 + T2 + T3 = 417$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Answer Key

Find each determinant. Use the given variable value when provided. Show your work.

3. det(A)

$$A = \begin{bmatrix} 0 & 2 & 1 \\ -2 & 6 & 1 \\ 1 & 2 & -6 \end{bmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (6)(-6) - (1)(2) = -38$

$T1 = (0) \times M1 = 0$

$M2 = (-2)(-6) - (1)(1) = 11$

$T2 = -(2) \times M2 = -22$

$M3 = (-2)(2) - (6)(1) = -10$

$T3 = (1) \times M3 = -10$

Add the three signed terms.

$det(A) = T1 + T2 + T3 = -32$

4. det(A)

$$A = \begin{bmatrix} -3 & 3 & 3 \\ -6 & 6 & 0 \\ -2 & 4 & -1 \end{bmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (6)(-1) - (0)(4) = -6$

$T1 = (-3) \times M1 = 18$

$M2 = (-6)(-1) - (0)(-2) = 6$

$T2 = -(3) \times M2 = -18$

$M3 = (-6)(4) - (6)(-2) = -12$

$T3 = (3) \times M3 = -36$

Add the three signed terms.

$det(A) = T1 + T2 + T3 = -36$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Answer Key

Find each determinant. Use the given variable value when provided. Show your work.

5. det(A)

$$A = \begin{bmatrix} -4 & 3 & 2 \\ 6 & -1 & -2 \\ -3 & 1 & -4 \end{bmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (-1)(-4) - (-2)(1) = 6$

$T1 = (-4) \times M1 = -24$

$M2 = (6)(-4) - (-2)(-3) = -30$

$T2 = -(3) \times M2 = 90$

$M3 = (6)(1) - (-1)(-3) = 3$

$T3 = (2) \times M3 = 6$

Add the three signed terms.

$\det(A) = T1 + T2 + T3 = 72$

6. det(A)

$$A = \begin{bmatrix} 0 & 4 & 0 \\ 6 & -5 & 3 \\ -2 & 2 & -4 \end{bmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (-5)(-4) - (3)(2) = 14$

$T1 = (0) \times M1 = 0$

$M2 = (6)(-4) - (3)(-2) = -18$

$T2 = -(4) \times M2 = 72$

$M3 = (6)(2) - (-5)(-2) = 2$

$T3 = (0) \times M3 = 0$

Add the three signed terms.

$\det(A) = T1 + T2 + T3 = 72$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Answer Key

Find each determinant. Use the given variable value when provided. Show your work.

7. D

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

Expand along the first row. The signs are +, -, +.

$M1 = (-2)(0) - (2)(5) = -10$

$T1 = (4) \times M1 = -40$

$M2 = (-1)(0) - (2)(-4) = 8$

$T2 = -(-5) \times M2 = 40$

$M3 = (-1)(5) - (-2)(-4) = -13$

$T3 = (0) \times M3 = 0$

Add the three signed terms.

$D = T1 + T2 + T3 = 0$

8. D

$$D = \begin{vmatrix} 1 & -4 & 3 \\ 0 & 2 & -6 \\ 2 & 6 & -5 \end{vmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (2)(-5) - (-6)(6) = 26$

$T1 = (1) \times M1 = 26$

$M2 = (0)(-5) - (-6)(2) = 12$

$T2 = -(-4) \times M2 = 48$

$M3 = (0)(6) - (2)(2) = -4$

$T3 = (3) \times M3 = -12$

Add the three signed terms.

$D = T1 + T2 + T3 = 62$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Answer Key

Find each determinant. Use the given variable value when provided. Show your work.

9. D

$$D = \begin{vmatrix} 2 & 4 & -2 \\ 0 & 3 & 2 \\ 4 & -1 & 3 \end{vmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (3)(3) - (2)(-1) = 11$

$T1 = (2) \times M1 = 22$

$M2 = (0)(3) - (2)(4) = -8$

$T2 = -(4) \times M2 = 32$

$M3 = (0)(-1) - (3)(4) = -12$

$T3 = (-2) \times M3 = 24$

Add the three signed terms.

$D = T1 + T2 + T3 = 78$

10. D

$$D = \begin{vmatrix} -5 & -4 & 1 \\ -5 & 3 & -5 \\ -1 & 6 & -1 \end{vmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (3)(-1) - (-5)(6) = 27$

$T1 = (-5) \times M1 = -135$

$M2 = (-5)(-1) - (-5)(-1) = 0$

$T2 = -(-4) \times M2 = 0$

$M3 = (-5)(6) - (3)(-1) = -27$

$T3 = (1) \times M3 = -27$

Add the three signed terms.

$D = T1 + T2 + T3 = -162$

Name _____ Score _____ / 12 Teacher _____ Date _____

Matrix Determinants 3 × 3

Answer Key

Find each determinant. Use the given variable value when provided. Show your work.

11. D

$$D = \begin{vmatrix} -2 & -1 & 6 \\ -5 & -4 & 1 \\ -3 & 2 & -3 \end{vmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (-4)(-3) - (1)(2) = 10$

$T1 = (-2) \times M1 = -20$

$M2 = (-5)(-3) - (1)(-3) = 18$

$T2 = -(-1) \times M2 = 18$

$M3 = (-5)(2) - (-4)(-3) = -22$

$T3 = (6) \times M3 = -132$

Add the three signed terms.

$D = T1 + T2 + T3 = -134$

12. D

$$D = \begin{vmatrix} -1 & 2 & -3 \\ 0 & -5 & -5 \\ 2 & 0 & -6 \end{vmatrix}$$

Expand along the first row. The signs are +, -, +.

$M1 = (-5)(-6) - (-5)(0) = 30$

$T1 = (-1) \times M1 = -30$

$M2 = (0)(-6) - (-5)(2) = 10$

$T2 = -(2) \times M2 = -20$

$M3 = (0)(0) - (-5)(2) = 10$

$T3 = (-3) \times M3 = -30$

Add the three signed terms.

$D = T1 + T2 + T3 = -80$