Evaluate each determinant.

1. $\begin{vmatrix} 8 & 6 \\ 5 & 7 \end{vmatrix}$

ANSWER:

26

3. $\begin{vmatrix} -4 & 12 \\ 9 & 5 \end{vmatrix}$

ANSWER:

−128

Evaluate each determinant using diagonals.

5. $\begin{vmatrix} 3 & -2 & 2 \\ -4 & 2 & -5 \\ -3 & 1 & 4 \end{vmatrix}$

ANSWER:

−19

7. $\begin{vmatrix} 8 & 4 & 0 \\ -2 & -6 & -1 \\ 5 & -3 & 6 \end{vmatrix}$

ANSWER:

−284

9. $\begin{vmatrix} 8 & 3 & 4 \\ 2 & 4 & 2 \\ 1 & 6 & 5 \end{vmatrix}$

ANSWER:

72

11. $\begin{vmatrix} 2 & -6 & -3 \\ 7 & 9 & -4 \\ -6 & 4 & 9 \end{vmatrix}$

ANSWER:

182

Use Cramer's Rule to solve each system of equations.

13. $4x - 5y = 39$
$3x + 8y = -6$

ANSWER:

$(6, -3)$

15. $-8a - 5b = -27$
$7a + 6b = 22$

ANSWER:

$(4, -1)$

17. **CCSS PERSEVERANCE** The ″Bermuda Triangle″ is an area located off the southeastern Atlantic coast of the United States, and noted for reports of unexplained losses of ships, small boats, and aircraft.

a. Find the area of the triangle on the map.
b. Suppose each grid represents 175 miles. What is the area of the Bermuda Triangle?

ANSWER:

a. 15.75 units^2

b. 482,343.75 mi^2

Use Cramer's Rule to solve each system of equations.

19. $-3x - 5y + 10z = -4$
$-8x + 2y - 3z = -91$
$6x + 8y - 7z = -35$

ANSWER:

$\left(\dfrac{66}{7}, -\dfrac{116}{7}, -\dfrac{41}{7} \right)$

21. $-9x + 5y + 3z = 50$
$7x + 8y - 2z = -60$
$-5x + 7y + 5z = 46$

ANSWER:
$(-4, -2, 8)$

23. $9a + 7b = -30$
$8b + 5c = 11$
$-3a + 10c = 73$

ANSWER:
$(-1, -3, 7)$

25. $x + y + z = 12$
$6x - 2y - z = 16$
$3x + 4y + 2z = 28$

ANSWER:
$(4, 0, 8)$

Evaluate each determinant.

27. $\begin{vmatrix} -8 & -9 \\ 11 & 12 \end{vmatrix}$

ANSWER:
3

29. $\begin{vmatrix} 3 & 5 & -2 \\ -1 & -4 & 6 \\ -6 & -2 & 5 \end{vmatrix}$

ANSWER:
-135

31. $\begin{vmatrix} -5 & -1 & -2 \\ 1 & 8 & 4 \\ 0 & -6 & 9 \end{vmatrix}$

ANSWER:
-459

33. $\begin{vmatrix} -8 & -3 & -9 \\ 0 & 0 & 0 \\ 8 & -2 & -4 \end{vmatrix}$

ANSWER:
0

35. $\begin{vmatrix} 1 & -8 & -9 \\ 6 & 5 & -6 \\ -2 & -8 & 10 \end{vmatrix}$

ANSWER:
728

37. $\begin{vmatrix} -4 & 1 & -2 \\ 10 & 12 & 9 \\ -6 & 0 & 13 \end{vmatrix}$

ANSWER:
-952

Use Cramer's Rule to solve each system of equations.

39. $6x - 5y = 73$
$-7x + 3y = -71$

ANSWER:
$(8, -5)$

41. $-4c - 5d = -39$
$5c + 8d = 54$

ANSWER:
$(6, 3)$

43. $9r + 4s = -55$
$-5r - 3s = 36$

ANSWER:
$(-3, -7)$

45. $5x - 4y + 6z = 58$
$-4x + 6y + 3z = -13$
$6x + 3y + 7z = 53$

ANSWER:
$(4, -2, 5)$

47. **DOUGHNUTS** Mi-Ling is ordering doughnuts for a class party. The box contains 2 dozen doughnuts, some of which are plain and some of which are jelly-filled. The plain doughnuts each cost $0.50, and the jelly-filled cost $0.60. If the total cost is $12.60, use Cramer's Rule to find how many jelly-filled doughnuts Mi-Ling ordered.

ANSWER:

6

49. **ARCHAEOLOGY** Archaeologists found whale bones at coordinates (0, 3), (4, 7), and (5, 9). If the units of the coordinates are meters, find the area of the triangle formed by these finds.

ANSWER:

$2 \, m^2$

Use Cramer's Rule to solve each system of equations.

51. $3a - 5b - 9c = 17$
$4a - 3c = 31$
$-5a - 4b - 2c = -42$

ANSWER:

$(4, 8, -5)$

53. $7x + 8y + 9z = -149$
$-6x + 7y - 5z = 54$
$4x + 5y - 2z = -44$

ANSWER:

$\left(-\dfrac{6187}{701}, -\dfrac{2904}{701}, -\dfrac{4212}{701} \right)$

55. **FINANCIAL LITERACY** A vendor sells small drinks for $1.15, medium drinks for $1.75, and large drinks for $2.25. During a week in which he sold twice as many small drinks as medium drinks, his total sales were $2,238.75 for 1385 drinks.
a. Use Cramer's Rule to determine how many of each drink were sold.
b. The vendor decided to increase the price for small drinks to $1.25 the next week. The next week, he sold 140 fewer small drinks, 125 more medium drinks, and 35 more large drinks. Calculate his sales for that week.
c. Was raising the price of the small drink a good business move? Explain.

ANSWER:

a. small: 650; medium: 325; large: 410
b. $2,426.25
c. It seems like it was a good move for the vendor. Although he sold fewer small drinks, he sold more medium and large drinks and on the whole, made more money this week than in the previous week.

57. **REASONING** What can you determine about the solution of a system of linear equations if the determinant of the coefficients is 0?

ANSWER:

Sample answer: There is no unique solution of the system. There are either infinite or no solutions.

59. **CHALLENGE** Find the determinant of a 3 × 3 matrix defined by

$$a_{mn} = \begin{cases} 0 & \text{if } m+n \text{ is even} \\ m+n & \text{if } m+n \text{ is odd} \end{cases}.$$

ANSWER:

0

61. **WRITING IN MATH** Describe the possible graphical representations of a 2 × 2 system of linear equations if the determinant of the matrix of coefficients is 0.

    ANSWER:

    Sample answer: Given a 2 × 2 system of linear equations, if the determinant of the matrix of coefficients is 0, then the system does not have a unique solution. The system may have no solution and the graphical representation shows two parallel lines. The system may have infinitely many solutions in which the graphical representation will be the same line.

63. Use the table to determine the expression that best represents the number of faces of any prism having a base with n sides.
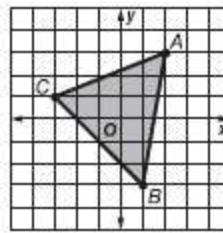
Base	Sides of Base	Faces of Prisms
triangle	3	5
quadrilateral	4	6
pentagon	5	7
hexagon	6	8
heptagon	7	9
octagon	8	10

    F $2(n - 1)$
    G $2(n + 1)$
    H $n + 2$
    J $2n$

    ANSWER:
    H

65. **SAT/ACT** Find the area of $\triangle ABC$.

    A 10 units^2
    B 12 units^2
    C 13 units^2
    D 14 units^2
    E 16 units^2

    ANSWER:
    D

    Determine whether each matrix product is defined. If so, state the dimensions of the product.

67. $C_{5 \times 4} \cdot D_{5 \times 3}$

    ANSWER:
    no

69. **BUSINESS The table lists the prices at the Sandwich Shoppe.**

Sandwich	Small	Medium	Large
ham	$4.50	$6.75	$9.50
salami	$4.50	$6.75	$9.50
veggie	$4.00	$6.25	$8.75
meatball	$4.75	$7.50	$10.25

a. List the prices in a 4 × 3 matrix.

b. The manager decides to cut the prices of every item by 20%. List this new set of data in a 4 × 3 matrix.

c. Subtract the second matrix from the first and determine the savings to the customer for each sandwich.

ANSWER:

a.
$$\begin{bmatrix} \$4.50 & \$6.75 & \$9.50 \\ \$4.50 & \$6.75 & \$9.50 \\ \$4.00 & \$6.25 & \$8.75 \\ \$4.75 & \$7.50 & \$10.25 \end{bmatrix}$$
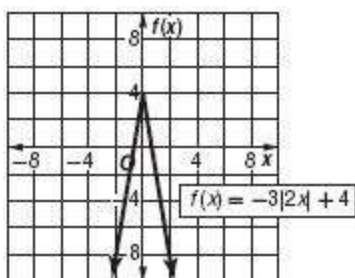
b.
$$\begin{bmatrix} \$3.60 & \$5.40 & \$7.60 \\ \$3.60 & \$5.40 & \$7.60 \\ \$3.20 & \$5.00 & \$7.00 \\ \$3.80 & \$6.00 & \$8.20 \end{bmatrix}$$

c.
$$\begin{bmatrix} \$0.90 & \$1.35 & \$1.90 \\ \$0.90 & \$1.35 & \$1.90 \\ \$0.80 & \$1.25 & \$1.75 \\ \$0.95 & \$1.50 & \$2.05 \end{bmatrix}$$

Graph each function.

71. $f(x) = -3|2x| + 4$

ANSWER:

Solve each system of equations.

73. $2x - 5y = -26$
$5x + 3y = -34$

ANSWER:

$(-8, 2)$

75. $-3x - 2y = 17$
$-4x + 5y = -8$

ANSWER:

$(-3, -4)$