

Solve the system of equations using matrices (row operations). If the system has no solution, say that it is inconsistent.

$$1) \begin{cases} 6x + y = 8 \\ 9x + 3y = 6 \end{cases}$$

Solve the problem.

- 2) Find real numbers a , b , and c such that the graph of the function $y = ax^2 + bx + c$ contains the points $(-2, -4)$, $(1, -1)$, and $(3, -19)$.

Find the value of the determinant.

$$3) \begin{vmatrix} 3 & 4 \\ -8 & 8 \end{vmatrix}$$

Solve for x .

$$4) \begin{vmatrix} 5 & 9 \\ -2 & x \end{vmatrix} = 8$$

Solve the system of equations using Cramer's Rule if it is applicable. If Cramer's Rule is not applicable, say so.

$$5) \begin{cases} 4x - 7y = 5 \\ 2x + 5y = -3 \end{cases}$$

Find the value of the determinant.

$$6) \begin{vmatrix} 2 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 5 & 6 \end{vmatrix}$$

Solve the system of equations using Cramer's Rule if it is applicable. If Cramer's Rule is not applicable, say so.

$$7) \begin{cases} -2x - 7z = -81 \\ -3x + 3y + 3z = 21 \\ 2x - 2y = 4 \end{cases}$$

Perform the indicated operation, whenever possible.

$$8) [2 \ 4] + \begin{bmatrix} -4 \\ 6 \end{bmatrix}$$

$$9) \begin{bmatrix} 8 & -7 \\ -6 & -9 \\ 5 & 6 \end{bmatrix} + \begin{bmatrix} 7 & 2 \\ 7 & 1 \\ 8 & -7 \end{bmatrix}$$

Find the indicated expression.

$$10) \text{ If } A = \begin{bmatrix} 2 & -1 \\ 7 & 9 \end{bmatrix} \text{ and } B = \begin{bmatrix} 5 & -3 \\ 4 & 7 \end{bmatrix}, \text{ find } -2A + 4B.$$

$$A) \begin{bmatrix} 16 & -10 \\ 2 & 10 \end{bmatrix} \quad B) \begin{bmatrix} 7 & 4 \\ 11 & 13 \end{bmatrix}$$

$$C) \begin{bmatrix} -24 & -18 \\ -30 & -34 \end{bmatrix} \quad D) \begin{bmatrix} -3 & -6 \\ 3 & 5 \end{bmatrix}$$

Compute the product.

$$11) \begin{bmatrix} -1 & -1 & 3 \\ 9 & 4 & -6 \end{bmatrix} \begin{bmatrix} 2 & 3 & -8 \\ -7 & -3 & -6 \\ 4 & -3 & 8 \end{bmatrix}$$

Each matrix is non singular. Find the inverse of the matrix. Be sure to check your answer.

$$12) \begin{bmatrix} 6 & -4 \\ 0 & 4 \end{bmatrix}$$

Solve the system using the inverse matrix method.

$$13) \begin{cases} x + 3y = -8 \\ 21x + 6y = 3 \end{cases}$$

Write the partial fraction decomposition of the rational expression.

$$14) \frac{x - 1}{(x - 4)(x - 3)}$$

$$15) \frac{50 - 7x}{x^3 - 10x^2 + 25x}$$

$$16) \frac{x^2 - 111}{x^4 - x^2 - 72}$$

$$17) \frac{x^2 + 2x - 2}{(x^2 + 2)^2}$$

Problems 18 - 21 are from section 8.6 and might not have been covered. Check with your calendar to see.

Solve using substitution.

$$18) \begin{cases} x^2 + y^2 = 181 \\ x + y = -19 \end{cases}$$

Solve using elimination.

$$19) \begin{cases} 5x^2 - 2y^2 = 2 \\ 3x^2 + 4y^2 = 48 \end{cases}$$

Solve the problem.

20) The sum of the squares of two numbers is 26.
The sum of the two numbers is 6. Find the two numbers.

21) The perimeter of a rectangle is 26 inches and its area is 36 square inches. What are its dimensions?

Evaluate the factorial expression.

$$22) \frac{6!}{4!}$$

Write out the first five terms of the sequence.

$$23) \{s_n\} = \{3n - 3\}$$

$$24) \{s_n\} = \left\{ (-1)^n - 1 \left(\frac{n+3}{2n-1} \right) \right\}$$

The given pattern continues. Write down the n th term of the sequence $\{a_n\}$ suggested by the pattern.

$$25) 4, 10, 16, 22, 28, \dots$$

$$26) 1, \frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \dots$$

The sequence is defined recursively. Write the first four terms.

$$27) a_1 = 5; a_n = 3a_{n-1} + 1$$

$$28) a_1 = -9; a_n = n - a_{n-1}$$

Solve.

29) Given that $a_1 = -4$, $a_2 = -4$ and $a_{n+2} = a_{n+1} - 4a_n$, what is the fifth term of this recursively defined sequence?

Write out the sum.

$$30) \sum_{k=1}^n (k+10)^2$$

Express the sum using summation notation.

$$31) 2 + 4 + 6 + \dots + 12$$

$$32) 7 + \frac{7^2}{2} + \frac{7^3}{3} + \dots + \frac{7^n}{n}$$

Find the sum of the sequence.

$$33) \sum_{k=3}^6 (4k - 4)$$

$$34) \sum_{k=1}^4 \left(-\frac{1}{4} \right)^k$$

An arithmetic sequence is given. Find the common difference and write out the first four terms.

$$35) \{s_n\} = \{5n + 6\}$$

Find the n th term and the indicated term of the arithmetic sequence $\{a_n\}$ whose initial term, a , and common difference, d , are given.

$$36) a_1 = 9; d = -2$$

$$a_n = ?; a_{14} = ?$$

Find the indicated term of the arithmetic sequence.

37) The nineteenth term of the arithmetic sequence 0, 6, 12, ...

Find the first term, the common difference, and give a recursive formula for the arithmetic sequence.

$$38) 7\text{th term is } -9; 15\text{th term is } -33$$

Find the sum.

$$39) 2 + 4 + 6 + \dots + 610$$

$$40) \sum_{n=1}^{28} (4n - 4)$$

Solve.

41) A local civic theater has 22 seats in the first row and 21 rows in all. Each successive row contains 3 additional seats. How many seats are in the civic theater?

A geometric sequence is given. Find the common ratio and write out the first four terms.

42) $\{s_n\} = \{6^n\}$

43) $\{d_n\} = \left\{ \frac{3n}{18} \right\}$

Determine whether the given sequence is arithmetic, geometric, or neither. If the sequence is arithmetic, find the common difference; if it is geometric, find the common ratio.

44) $\{3n - 4\}$

45) $\{5n^2 - 3\}$

Find the fifth term and the n th term of the geometric sequence whose initial term, a , and common ratio, r , are given.

46) $a = 6; r = -5$

Find the indicated term of the geometric sequence.

47) 7th term of $-1, 2, -4, \dots$

Find the n th term $\{a_n\}$ of the geometric sequence. When given, r is the common ratio.

48) $6, 3, \frac{3}{2}, \frac{3}{4}, \dots$

Solve.

49) For the geometric sequence $2, 1, \frac{1}{2}, \frac{1}{4}, \dots$, find

a_n .

50) A new piece of equipment cost a company \$69,000. Each year, for tax purposes, the company depreciates the value by 25%. What value should the company give the equipment after 7 years?

Answer Key

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1) $x = 2, y = -4$

2) $a = -2, b = -1, c = 2$

3) 56

4) -2

5) $x = \frac{2}{17}, y = -\frac{11}{17}$

6) 18

7) $x = 9, y = 7, z = 9$

8) not defined

9)

$$\begin{bmatrix} 15 & -5 \\ 1 & -8 \\ 13 & -1 \end{bmatrix}$$

10) A

11)

$$\begin{bmatrix} 17 & -9 & 38 \\ -34 & 33 & -144 \end{bmatrix}$$

12)

$$\begin{bmatrix} \frac{1}{6} & \frac{1}{6} \\ 0 & \frac{1}{4} \end{bmatrix}$$

13) $x = 1, y = -3$

14) $\frac{3}{x-4} + \frac{-2}{x-3}$

15) $\frac{2}{x} + \frac{-2}{x-5} + \frac{3}{(x-5)^2}$

16) $\frac{1}{x+3} - \frac{1}{x-3} + \frac{7}{x^2+8}$

17) $\frac{1}{x^2+2} + \frac{2x-4}{(x^2+2)^2}$

18) $x = -9, y = -10; x = -10, y = -9$

19) $x = 2, y = 3; x = -2, y = 3; x = 2, y = -3; x = -2, y = -3$

20) 1 and 5

21) 4 in. by 9 in.

22) 30

23) $s_1 = 0, s_2 = 3, s_3 = 6, s_4 = 9, s_5 = 12$

24) $s_1 = 4, s_2 = -\frac{5}{3}, s_3 = \frac{6}{5}, s_4 = -1, s_5 = \frac{8}{9}$

25) $a_n = 2(3n - 1)$

26) $a_n = \frac{1}{4n - 1}$

27) $a_1 = 5, a_2 = 16, a_3 = 49, a_4 = 148$

28) $a_1 = -9, a_2 = 11, a_3 = -8, a_4 = 12$

29) $a_5 = -20$

Answer Key

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30) $121 + 144 + 169 + \dots + (n + 10)^2$

31)

$$\sum_{k=1}^6 2k$$

32) $\sum_{k=1}^n \frac{7^k}{k}$

33) 56

34) $-\frac{51}{256}$

35) $d = 5; s_1 = 11, s_2 = 16, s_3 = 21, s_4 = 26$

36) $a_n = 11 - 2n; a_{14} = -17$

37) 108

38) $a_1 = 9, d = -3, a_n = a_{n-1} - 3$

39) 93,330

40) 1512

41) 1092 seats

42) $r = 6; s_1 = 6, s_2 = 36, s_3 = 216, s_4 = 1296$

43) $r = 3; d_1 = \frac{1}{6}, d_2 = \frac{1}{2}, d_3 = \frac{3}{2}, d_4 = \frac{9}{2}$

44) Arithmetic; $d = 3$

45) Neither

46) $a_5 = 3750; a_n = 6 \cdot (-5)^{n-1}$

47) $a_7 = -64$

48) $a_n = 6 \left(\frac{1}{2}\right)^{n-1}$

49) $a_n = \left(\frac{1}{2}\right)^{n-2}$

50) \$9210