

Section 3.2: Arithmetic Sequences and Series

Exercises

State whether the following sequences are arithmetic or not. If they are, state the first term and common difference.

1. 8, 9, 11, 13, 16, ...

2. -3, -10, -17, -24, ...

3. 3, 6, 12, 24, ...

4. 1, 2, 6, 24, ...

5. 81, 72, 63, 54, ...

6. $1, \frac{5}{4}, \frac{3}{2}, \frac{7}{4}, 2, \frac{9}{4}, \dots$

Give both the general formula (or n^{th} term a_n) and the recursive formula for the following arithmetic sequences. For the general formula, be sure to simplify your answer.

7. 1, 3, 5, 7, ...

8. 5, -6, -17, -28, ...

9. -40, -37, -34, -31, ...

10. 24, 28, 32, 36, ...

For the following arithmetic sequences, calculate a_{50} and a_{261} .

11. 18, 16, 14, 12, ...

12. 12, 12.3, 12.6, 12.9, ...

State whether the following recursively defined sequences are arithmetic or not. (Is there an easy way to tell?)

13.
$$\begin{cases} a_1 = 5 \\ a_n = a_{n-1} + 4 \end{cases}$$

14.
$$\begin{cases} a_1 = 12 \\ a_n = 2a_{n-1} \end{cases}$$

$$15. \begin{cases} a_1 = 75 \\ a_n = a_{n-1} - 20 \end{cases}$$

$$16. \begin{cases} a_1 = 6 \\ a_n = a_{n-1} + 1 \end{cases}$$

$$17. \begin{cases} a_1 = 7 \\ a_n = 2 - a_{n-1} \end{cases}$$

$$18. \begin{cases} a_1 = 3 \\ a_n = (a_{n-1})^2 \end{cases}$$

19. For the following sequence, calculate the 201st term: 5, 15, 25, 35, ...

20. For the following sequence, which term equals 137? 1, 9, 17, 25, ...

21. What is the common difference for the arithmetic sequence with $a_1 = 200$ and $a_{12} = -240$?

22. Calculate the first term for the arithmetic sequence with common difference 7 whose sixteenth term is 102.

23. Calculate the first four terms of the arithmetic sequence in which the sixth term is 17 and the sixtieth term is 179.

24. Calculate the first four terms of the arithmetic sequence in which the one hundredth term is 403 and the sixty-fourth term is 259.

25. Give a general formula for the arithmetic sequence in which the twentieth term is -107 and the thirty-fifth term is -152 .

26. Give a recursive formula for the arithmetic sequence in which the eleventh term is 44 and the fifty-second term is 290.

27. Calculate S_{20} for the series $100 + 97 + 94 + \dots$

28. Evaluate the series $12 + 17 + 22 + \dots 82$.

29. Evaluate the series $144 + 138 + 132 + \dots 78$.

30. Calculate S_{100} for the series $-20 + -16 + -12 + \dots$

31. Calculate the sum of the odd numbers between 100 and 500.

32. Find the sum of the natural numbers from 50 to 125, inclusive.

Calculate the following sums.

$$33. \sum_{k=0}^{53} 5k - 1$$

$$34. \sum_{j=10}^{92} 6j$$

$$35. \sum_{i=30}^{140} 2i + 7$$

$$36. \sum_{k=3}^{502} 17 - 3k$$

37. In a supermarket display, there are 37 cans in the bottom layer, 35 in the next layer up, 33 in the next, and so on. How many layers are there if there are 7 cans in the top row?

38. In the previous problem, how many cans are there altogether?

39. In an old-fashioned theatre, there are 25 seats in the first row, 26 in the next, 27 in the one after, and so on. If there are 20 rows in total, how many seats are there altogether?