Calculus 2 Workbook

Sequences

krista king
MATH

SEQUENCES VS. SERIES

■ 1. Determine whether the expression is a sequence or a series.

$$5, \ 10, \ 15, \ 20 \ , \ 25, \ 30$$

■ 2. Determine whether the expression is a sequence or a series.

$$\sum_{n=1}^{15} 5n - 2$$

■ 3. Determine whether the expression is a sequence or a series.

$$3 + 6 + 9 + 12 + 15 + 18 + 21$$

LISTING THE FIRST TERMS

■ 1. Write the first five terms of the sequence.

$$a_{n+1} = 3a_n + 4$$

$$a_1 = 4$$

■ 2. Write the first five terms of the sequence.

$$a_{n+1} = 4a_n - 5$$

$$a_1 = 3$$

■ 3. Write the first five terms of the sequence.

$$a_{n+1} = a_n + 9$$

$$a_1 = 24$$

CALCULATING THE FIRST TERMS

■ 1. Write the first five terms of the sequence and find the limit of the sequence a_n as $n \to \infty$.

$$a_n = \frac{5n^2 - 2}{n^2 + 3n - 2}$$

■ 2. Write the first five terms of the sequence and find the limit of the sequence a_n as $n \to \infty$.

$$a_n = \frac{6n}{e^{2n}}$$

■ 3. Write the first five terms of the sequence and find the limit of the sequence a_n as $n \to \infty$.

$$a_n = \frac{n^2 + 1}{n^2 + 8n}$$

FORMULA FOR THE GENERAL TERM

■ 1. What is a formula for the general term of the sequence?

$$\frac{3}{4}, \frac{5}{8}, \frac{7}{12}, \frac{9}{16}, \frac{11}{20}$$

■ 2. What is a formula for the general term of the sequence?

$$5, 8, 13, 20, 29, 40$$

■ 3. What is a formula for the general term of the sequence?

$$-\frac{1}{6}, \frac{2}{7}, -\frac{3}{8}, \frac{4}{9}, -\frac{1}{2}, \frac{6}{11}$$

CONVERGENCE OF A SEQUENCE

■ 1. If the sequence converges, find its limit.

$$a_n = \frac{5n}{n^2 + 2n - 1}$$

■ 2. If the sequence converges, find its limit.

$$a_n = \frac{9n^3 - 27n^2 + 5n}{3n^3 + 12n^2 - n}$$

■ 3. If the sequence converges, find its limit.

$$a_n = \left(\frac{n^2 + 3}{n^3} \right)^2$$

LIMIT OF A CONVERGENT SEQUENCE

■ 1. Find the limit of the convergent sequence.

$$a_n = \frac{3n^2 - 6}{9n^2 + 3n - 12}$$

■ 2. Find the limit of the convergent sequence.

$$a_n = \frac{n^3}{3^n}$$

■ 3. Find the limit of the convergent sequence.

$$a_n = n^5 e^{-2n}$$

INCREASING, DECREASING, AND NOT MONOTONIC

■ 1. State whether the sequence is increasing, decreasing, and monotonic or not monotonic.

$$a_n = \frac{17}{4n^2 + 6n + 3}$$

■ 2. State whether the sequence is increasing, decreasing, and monotonic or not monotonic.

$$a_n = \frac{3n^2 - 5}{4n + 2}$$

■ 3. State whether the sequence is increasing, decreasing, and monotonic or not monotonic.

$$a_n = n^5 + 1$$

BOUNDED SEQUENCES

■ 1. Describe how the sequence is bounded by indicating the upper and lower bounds, or say whether there is no upper bound or now lower bound.

$$a_n = \frac{2n + 5}{n^2}$$

■ 2. Describe how the sequence is bounded by indicating the upper and lower bounds, or say whether there is no upper bound or now lower bound.

$$a_n = \frac{3n^3 + 2}{n^4}$$

■ 3. Describe how the sequence is bounded by indicating the upper and lower bounds, or say whether there is no upper bound or now lower bound.
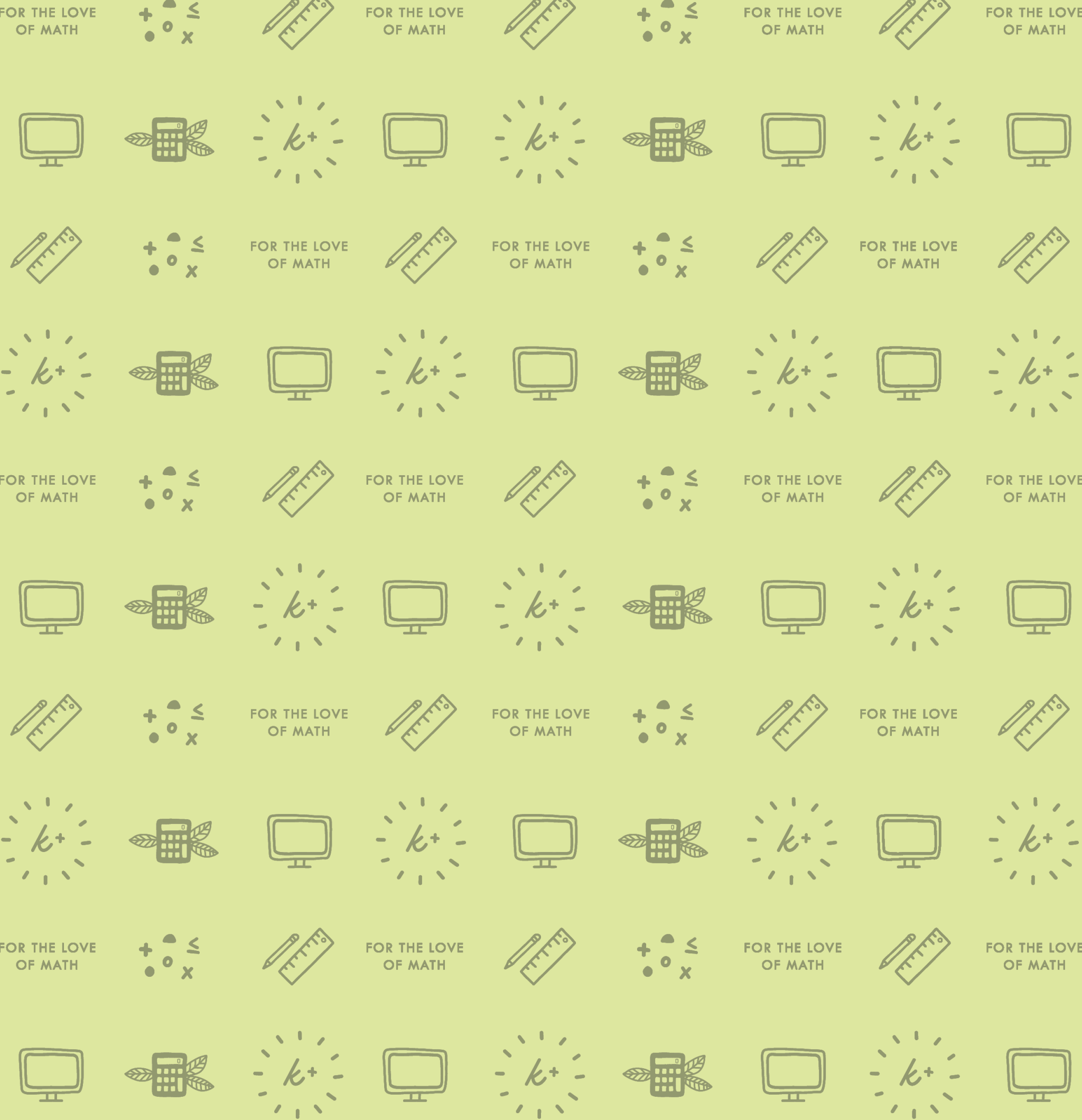
$$a_n = \frac{7n^3 + 15}{2n^3}$$

■ 4. Describe how the sequence is bounded by indicating the upper and lower bounds, or say whether there is no upper bound or now lower bound.

$$a_n = \frac{3n^4 + 9}{4n^3}$$