Introduce the concept of sequence

Goal

1. Define a sequence of numbers

2. Identify a sequence of numbers with either a explicit or recursive formula

3. Determine whether a sequence is bounded and/or has a limit

What is a sequence? A sequence, S_n is a list of numbers (usually infinite) such that the nth element of the list, s_n, can be defined by either its position in the list only or in terms of its position and the previous terms or in terms of previous terms only. If an element of a sequence is defined by a function of its position only, the sequence is defined with an explicit formula. If it is defined as a function of the previous terms, the formula is called recursive. For the following sequences, try to determine the next three terms, and determine the formula you used to find them, whether explicit or recursive.

1. $S_n = 1, 3, 5, 7, 9, 11, ...$

2. $S_n = 1, 4, 9, 16, 25, 36, ...$

3. $S_n = 1, 3, 7, 15, 31, 63, ...$

4. $S_n = 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, ...$

5. $S_n = 2, 4, 8, 16, 32, 64, ...$

6. $S_n = \frac{3}{5}, \frac{5}{7}, \frac{7}{9}, \frac{9}{11}, \frac{11}{13}, \frac{13}{15}, ...$

7. $S_n = 1, 1, 2, 3, 5, 8, ...$

8. $S_n = \frac{1}{2}, -\frac{1}{3}, \frac{1}{4}, -\frac{1}{5}, \frac{1}{6}, -\frac{1}{7}, ...$