Series

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

1. Let the sequence
$$a_n = \left(\frac{1}{2}\right)^n$$
 and the series $s_n = \sum_{i=1}^n a_i$.

(a) Write down the first 3 terms of a_n .

(b) Find $\lim_{n \to \infty} a_n$

- (c) Write down the first 3 terms of s_n .
- (d) Hypothesize $\lim_{n\to\infty} s_n$

- 2. Consider the sequence $a_n = \frac{1}{3}^n$.
 - (a) Write down a few of the terms in the sequence a_n starting with n = 1.

We will record the sequence of partial sums by moving along the x-axis.

(b) Draw a box that is $\frac{1}{3}$ units high & $\frac{1}{3}$ units wide with the lower left "corner" on the origin.

> The height will correspond with a_1 and the total width across the page corresponds with s_1 .

(c) Draw the second box that has height a_2 immediately to the right of the box you drew in (b) (that is with the lower left "corner" at the point $(\frac{1}{3},0)$).



- (d) Identify the length that corresponds with s_2 .
- (e) Draw a third box with height and width a_3 immediately to the right of the box you drew in (c).
- (f) Identify the length that corresponds with s_3 .
- (g) It gets difficult to repeat the procedure for s_4 , s_5 and so on, but can you identify $\lim_{n\to\infty} s_n$ is on the graph above?
- (h) Draw a line that skims the top right hand side of the boxes. Find the equation of the line you just drew.

(i) Find $\lim_{n\to\infty} s_n$