Sequences & 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.

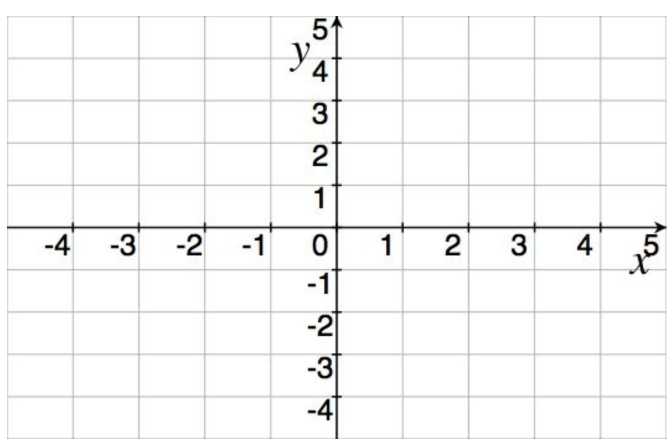
1. Write out the first few terms of the sequence defined by $a_n = (1 - .2^n)$.

2. Find a formula for the nth term (b_n) in the sequence $\{1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, ...\}$

A sequence $\{a_n\}$ has a *limit* L, denoted $\lim_{n\to\infty} a_n = L$ if we can make the terms a_n as close to L as we like by taking n sufficiently large. If $\lim_{n\to\infty} a_n$ exists, the sequence *converges*, otherwise it *diverges*.

3. Revisit #1 and 2 above and determine if the sequence converges or diverges. If the sequence converges, hypothesize what the limit is.

4. Recall in #2 you found a formula for b_n. Plot (n, b_n) for a few of the terms in the sequence to confirm your work in (3).



5. Let $\alpha_1 = 1$ (an initial condition) and *recursively* define the sequence $\alpha_n = \dfrac{\alpha_{n-1}^2}{2}$.

(a) Write down the first few terms of the sequence.

(b) Determine if the sequence converges or diverges. Yes, this one is harder than (1), just try to make headway.

6. Let the *sequence* $\beta_n = \left(\frac{1}{2}\right)^n$ and the *series* $s_n = \sum_{i=1}^{n} \beta_i$.

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

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

(c) Write down the first 3 terms of s_n.

(d) Hypothesize $\lim_{n\to\infty} s_n$