

Sequences of Sequences (Lecture Assignment)

Complete this assignment and submit it to Gradescope by 4:00pm on your class day. You can print this sheet, or write on your own paper. Contact us if internet connections or other issues require alternate arrangements.

For each sequence:

(a) Write out the first four numbers in the sequence.

(b) Determine whether the sequence converges (and if so, to what). Use correct notation, e.g. " $\lim_{n \rightarrow \infty} \frac{1}{n} = 0$."

1. $a_n = (-1)^n \frac{1}{\sqrt{n}}$

$\left\{ -1, \frac{1}{2}, -\frac{1}{3}, \frac{1}{4} \right\}$

$\lim_{n \rightarrow \infty} \frac{(-1)^n}{\sqrt{n}} = 0$

2. $b_n = \sin\left(\frac{\pi n}{2n+1}\right)$

$\left\{ \sin\left(\frac{\pi}{3}\right), \sin\left(\frac{2\pi}{5}\right), \sin\left(\frac{3\pi}{7}\right), \sin\left(\frac{4\pi}{9}\right) \right\}$

$\lim_{n \rightarrow \infty} \sin\left(\frac{\pi n}{2n+1}\right) = 1$

3. $c_1 = 1, c_{n+1} = \frac{c_n}{2}$ for $n > 1$.

$\left\{ \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16} \right\} = \frac{1}{2^n}$

$\lim_{n \rightarrow \infty} \frac{c_{n+1}}{2} = \lim_{n \rightarrow \infty} \frac{1}{2^2} = 0$

One-Minute Questions: Write a sentence for each.

A. What's one mathematical question you have after watching the videos?

Since you can't technically derive sequences, can you integrate them?

B. What's one interesting thing you learned from the book or videos?

I learned the definition of monotonicity.