

Math 1152Q: Fall '18**Week 2 In-class Practice, Friday, Sept 7**

Topics: Sec 11.1: Definition of convergence, ϵ, N proof, bounded sequences, decreasing/increasing sequences, Monotone Sequence Theorem.

1. (a) Let $\{b_n\}$ be a sequence. What does it mean to write $\lim_{n \rightarrow \infty} b_n = \infty$? Use Def 5, with M and N . (Answer: Copy from Sec 11.1 Def 5 page 697)

 - (b) Given a sequence $\{a_n\}$, what does it mean to write $\lim_{n \rightarrow \infty} a_n = 4$ mean? Use the ϵ and N definition. (Answer: Copy from Sec 11.1 Def 2 pg 696)

 - (c) What is a convergent sequence?
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2. (a) What is a bounded sequence?

 - (b) What is a monotonic sequence?

 - (c) What can you say about a bounded monotonic sequence?

 - (d) True or false? If $\{a_n\}$ and $\{b_n\}$ are divergent, then $\{a_n + b_n\}$ is divergent.

 - (e) True or false? If $\{a_n\}$ and $\{b_n\}$ are divergent, then $\{a_n b_n\}$ is divergent.

 - (f) True or false? If $\{a_n\}$ and $\{b_n\}$ are convergent, then $\{a_n b_n\}$ is convergent.

 - (g) If $\{a_n\}$ is decreasing and $a_n > 0$ for all n , then $\{a_n\}$ is convergent.

 - (h) True or false (No justification needed for now)? $0.99999 \dots = 1$.

 - (i) True or false (No justification needed for now)? $0.333 \dots$ is close to $\frac{1}{3}$ but $0.333 \dots \neq \frac{1}{3}$.

3. i.) (Graphing Review) Sketch each function. Label the asymptote/s and zero/s of the graph.

$$g(x) = \frac{2x - 4}{5x + 8}$$

- ii.) Fill in the blanks with either the sign \leq or \geq .

$$\begin{aligned} \frac{5n!}{2^n} & \text{ ______ } \left(\frac{1}{2}\right)^n \text{ for all } n \geq 1 \\ \frac{n-1}{7n+4} & \text{ ______ } \frac{1}{7} \text{ for all } n \geq 1 \\ \frac{n+1}{7n-4} & \text{ ______ } \frac{1}{7} \text{ for all } n \geq 1 \end{aligned}$$

- iii.) The sequence $a_k = \frac{2k+4}{5k-8}$ converges to $2/5$. For any number ϵ where $0 < \epsilon < 1$, choose N so that if $k > N$, then $\left| \frac{2}{5} - a_k \right| < \epsilon$.