

# Assignment 2 - Convergence II

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1. Using triangle inequality, show that for any real numbers  $x, y$

$$||x| - |y|| \leq |x - y|.$$

2. Define the notion of a bounded sequence. Show that every convergent sequence is bounded.
3. Let  $(x_n), (y_n)$  be convergent sequences. Show that the sequence  $(x_n y_n)$  is convergent and

$$\lim_{n \rightarrow \infty} x_n y_n = \left( \lim_{n \rightarrow \infty} x_n \right) \left( \lim_{n \rightarrow \infty} y_n \right)$$