

# Quiz 6 MTH 427/527 Fall 2024

Sunday, September 8, 2024 6:05 PM

$$a_n = \frac{2n+1}{n+2} \quad \text{Prove } \lim_{n \rightarrow \infty} a_n = 2.$$

Proof: let  $\epsilon > 0$ . Choose  $N \in \mathbb{N}$  so that  $N > \frac{3}{\epsilon} - 2$ . Let  $n > N$ , so in particular

$$n > N > \frac{3}{\epsilon} - 2. \text{ Thus, } n+2 > \frac{3}{\epsilon} \text{ and so } \frac{1}{n+2} < \frac{\epsilon}{3}, \text{ hence } \frac{3}{n+2} < \epsilon.$$

Now compute

$$|a_n - 2| = \left| \frac{2n+1}{n+2} - 2 \right| = \left| \frac{2n+1-2n-4}{n+2} \right|$$

$$= \left| \frac{-3}{n+2} \right| = \frac{3}{n+2} < \epsilon,$$

Completing the proof.  $\square$