MAC2312: Calculus 2 - Section 3

Quiz 18: 11.6 The Ratio and Root Tests — July 30, 2015

1. Determine whether the following series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{n}{5^n}$$

A. convergent

B. divergent

$$\begin{aligned}\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| &= \lim_{n\to\infty}\left|\frac{n+1}{5^{n+1}}\cdot\frac{5^n}{n}\right| \\ &= \lim_{n\to\infty}\left(\frac{n+1}{n}\cdot\frac{5^n}{5^{n+1}}\right) \\ &= \frac{1}{5}\lim_{n\to\infty}\left(1+\frac{1}{n}\right) = \frac{1}{5} < 1\end{aligned}$$

Therefore, by the Ratio Test, the series is convergent.