

$$\sum_{n=1}^{\infty} \frac{n}{n+1} = \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \dots$$

$$\hookrightarrow \lim_{n \rightarrow \infty} \frac{n}{n+1} = 1 \neq 0$$

Series diverges.

BUT: if $\lim_{n \rightarrow \infty} a_n = 0$, test is inconclusive.