QUESTION

Determine whether or not the series $\sum_{k=0}^{\infty} \dfrac{k+1}{k+4}$ is convergent.

ANSWER

$$u_k = \frac{k+1}{k+4} = \frac{k(1+\frac{1}{k})}{k(1+\frac{4}{k})} = \frac{1+\frac{1}{k}}{1+\frac{4}{k}} \to \frac{1}{1} = 1 \text{ as } k \to \infty$$

The terms tend to 1 therefore the series is not convergent.