

1. Let $\sum_{n=1}^{\infty} a_n$ be a given **convergent** series and let $c \neq 0$ be a constant. Prove that

$$\sum_{n=1}^{\infty} ca_n \text{ converges and } \sum_{n=1}^{\infty} ca_n = c \sum_{n=1}^{\infty} a_n.$$

2. Let $\sum_{k=1}^{\infty} a_k$ be an infinite series whose sequence of partial sums is $\{S_n\}$, where $S_n = \frac{4n}{3n+5}$.

- (a) Does the series $\sum_{k=1}^{\infty} a_k$ converge? If so, what is its sum? Explain your reasoning.
- (b) Find an explicit expression for the k^{th} term, a_k , of the series.