Exercise 5. (Q1.5): The series $\sum_{k=1}^{\infty} a_k$ converges.

Let $s_n = \sum_{k=1}^{n} a_k$ denote the partial series. The series $\sum_{k=1}^{\infty} a_k$ is said to converge to L if given any $\epsilon \in \mathbb{R} > 0$, there exists and $N \in \mathbb{N}$, such that whenever $n \in \mathbb{N} > N$,

$$|s_n - L| < \epsilon.$$