Consider an infinite sum of terms defined as the following:

Definition (Infinite Series)*:*
An **infinite series** *is an expression:*

$$S = \sum_{n=1}^{\infty} a_k = a_1 + a_2 + a_3 + \ldots$$

We write the nth partial sum $S_n = \sum_{k=1}^{\infty} a_k = a_1 + a_2 + \cdots + a_n$

From this infinite sum, we can generate a sequence of the nth partial sums. We say that $\sum_{n=1}^{\infty} a_k$ converges if $\{S_n\}$, $\sum_{n=1}^{\infty} a_k$ diverges to $\pm\infty$ if $\{S_n\}$ diverges to $\pm\infty$, and $\sum_{n=1}^{\infty} a_k$ "really" diverges if if $\{S_n\}$ really diverges.