Definition: Recursive Definitions of sum and Product

Given numbers $a_1, a_2, \ldots, a_n$, where n is a positive integer, the **summation from $i = 1$ to n of the a_i, denoted $\sum_{i=1}^{n} a_i$, is defined as**:

$$\sum_{i=1}^{1} a_i = a_1 \quad \text{and} \quad \sum_{i=1}^{n} a_i = \left(\sum_{i=1}^{n-1} a_i \right) + a_n, \qquad \text{if } n > 1$$

The **product from $i = 1$ to n of the a_i, denoted $\prod_{i=1}^{n} a_i$, is defined by**

$$\prod_{i=1}^{1} a_i = a_1 \quad \text{and} \quad \prod_{i=1}^{n} a_i = \left(\prod_{i=1}^{n-1} a_i \right) \cdot a_n, \qquad \text{if } n > 1$$