

0.1 Series

0.1.1 Definition

A series is the summation of a sequence. For a series a_n there is a corresponding series:

$$s_n = \sum_{i=0}^n a_n$$

Where:

$$\sum_{i=0}^n a_i = a_0 + a_1 + a_2 + \dots + a_n$$

0.1.2 Multiplication of summations

If all members of a sequence are multiplied by a constant, so is each member of the series.

We can take constants out of the series:

$$s_n = \sum_{i=0}^n a_i$$

$$s_n = \sum_{i=0}^n cb_i$$

$$s_n = c \sum_{i=0}^n b_i$$

0.1.3 Summation of constants

If all elements of a sequence are the same, then the series is a multiple of that constant.

$$s_n = \sum_{i=0}^n a_i$$

$$s_n = \sum_{i=0}^n c$$

$$s_n = nc$$

0.1.4 Addition of summations

Consider a sequence $a_i = b_i + c_i$.

$$s_n = \sum_{i=0}^n a_i$$

$$s_n = \sum_{i=0}^n (b_i + c_i)$$

We can then split this out.

$$s_n = \sum_{i=0}^n b_i + \sum_{i=0}^n c_i$$

0.1.5 Summation from a different start point

$$\sum_{i=0}^n a_i = a_0 + \sum_{i=1}^n a_i$$

0.1.6 Multiple summations

$$\sum_{i=0}^n \sum_{j=0}^m a_i = n \sum_{j=0}^m a_i$$

$$\sum_{i=0}^n \sum_{j=0}^m a_i b_j = \sum_{i=0}^n a_i \sum_{j=0}^m b_i$$