

Sequences and Series

Sigma Notation

The notation $\sum_{k=a}^b f(k)$

is the short hand for the sum of

$$f(a) + f(a+1) + f(a+2) + \dots + f(b)$$

where a and b are integers such that $a \leq b$.

Example 1

$$\begin{aligned} \sum_{k=1}^3 (2k+1) &= (2(1)+1) + (2(2)+1) + (2(3)+1) \\ &= 15 \end{aligned}$$

Example 2

$$\begin{aligned} \sum_{k=0}^4 (-2)^k &= (-2)^0 + (-2)^1 + (-2)^2 + (-2)^3 + (-2)^4 \\ &= 1 + (-2) + 4 + (-8) + 16 \\ &= 11 \end{aligned}$$

Example 3

$$\sum_{k=2}^5 3k^2 - 7 = (3(2)^2 - 7) + (3(3)^2 - 7) + (3(4)^2 - 7) + (3(5)^2 - 7)$$
$$= 134$$

Example 4

$$\sum_{k=-1}^2 (2k + 5)(k - 3) = -12 + (-15) + (-14) + (-9)$$
$$= -50$$