$\forall \sum_{n=1}^{\infty} a_n$ that converges, if we expect that the sum of all elements in the sequences converges to 0, then it must hold true that after a while the sum of the sequence of terms will also converge to 0.

Consider the sum of a sequence, defined:

$$\sum A_n = i_1 + i_2 + i_3 + \ldots + i_n \mid n = \infty$$
$$\implies \sum A_c = i_c + i_{c+1} + i_{c+2} + \ldots + i_{c+n} = A_{c+1}$$
$$\implies \text{the relation can be represented as } \sum A_d = A_{c+1} + a_c$$
$$\implies A_n = A_c = A_d$$

As the sum of the sequence of terms must converge to 0, $\implies a_n$ converges to 0 too.
$\therefore \lim_{x \to \infty} a_n = 0$