

## 4.4: Operations with Series

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$$\sum k u_n = k(\sum u_n)$$

If  $\sum u_n = S$  and  $\sum v_n = T$  then  $\sum (u_n + v_n) = S + T$

If  $\sum u_n = S$  then  $a + \sum u_n = a + S$ . This indicates that the insertion of a finite number of terms anywhere in the series doesn't affect its convergence.

If infinite series  $\sum u_n$  and  $\sum v_n$  are both convergent, then the series  $w_n = u_1 v_n + u_2 v_{n-1} + u_3 v_{n-2} + \dots + u_n v_1$  is also convergent. This operation is called the **Cauchy product** of the two series.

In general, term by term integration or differentiation will not always preserve convergence or divergence.