

Source: [KBhMATH401SubIndex](#)

## 1 | Series Convergence

In  $\sum_{k=0}^{\infty} a(r^k)$ , where  $|r| < 1$ , the series converges to  $\sum_{k=0}^{\infty} a(r^k) = \frac{a}{1-r}$ .

In  $\sum_{k=0}^n a(r^k)$ ,  $\sum_{k=0}^n a(r^k) = \frac{a-ar^{n+1}}{1-r}$

If the intergral to infinity is convergent, the sequence is convergent as long as the sequence is continuous, positive, and decreasing. The inverse applies, too.

### 1.1 | Power Series

$$\sum_{n=1}^{\infty} \frac{1}{n^p}$$

If a p-series has a  $p > 1$ , the p-series will converge

If a p-series has a  $p \leq 1$ , the p-series will diverge

### 1.2 | Comparison Test

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Also, if  $\lim_{n \rightarrow \infty} \frac{a_n}{b_n} = C$  ( $0 < c < \infty$ ), the two series will either both converge or both diverge. So you only need to test one.

Both provided that  $a_n, b_n \geq 0$  &  $a_n \leq b_n$

### 1.3 | Alternating Series Test

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### 1.4 | Ratio Test

In a geometric series, the common ratio is simply  $r$ .