

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.

Provided that $a_n, b_n \geq 0$ & $a_n \leq b_n$