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 <= 1, the p-series will diverge

1.2 | Comparison Test

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Also, if $\lim_{n\to\infty} \frac{a_n}{b_n} = C\ (0 < c < \infty)$, 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.

If $|r| < 1$, then series converges. If $|r| \geq 1$, the series diverges.