

<i>Test</i>	<i>When to Use</i>	<i>Conclusions</i>	<i>Section</i>
Geometric Series	$\sum_{k=0}^{\infty} ar^k$	Converges to $\frac{a}{1-r}$ if $ r < 1$; diverges if $ r \geq 1$.	8.2
<i>k</i> th-Term Test	All series	If $\lim_{k \rightarrow \infty} a_k \neq 0$, the series diverges.	8.2
Integral Test	$\sum_{k=1}^{\infty} a_k$ where $f(k) = a_k$, f is continuous and decreasing and $f(x) \geq 0$	$\sum_{k=1}^{\infty} a_k$ and $\int_1^{\infty} f(x) dx$ both converge or both diverge.	8.3
<i>p</i> -series	$\sum_{k=1}^{\infty} \frac{1}{k^p}$	Converges for $p > 1$; diverges for $p \leq 1$.	8.3
Comparison Test	$\sum_{k=1}^{\infty} a_k$ and $\sum_{k=1}^{\infty} b_k$, where $0 \leq a_k \leq b_k$	If $\sum_{k=1}^{\infty} b_k$ converges, then $\sum_{k=1}^{\infty} a_k$ converges. If $\sum_{k=1}^{\infty} a_k$ diverges, then $\sum_{k=1}^{\infty} b_k$ diverges.	8.3
Limit Comparison Test	$\sum_{k=1}^{\infty} a_k$ and $\sum_{k=1}^{\infty} b_k$, where $a_k, b_k > 0$ and $\lim_{k \rightarrow \infty} \frac{a_k}{b_k} = L > 0$	$\sum_{k=1}^{\infty} a_k$ and $\sum_{k=1}^{\infty} b_k$ both converge or both diverge.	8.3
Alternating Series Test	$\sum_{k=1}^{\infty} (-1)^{k+1} a_k$ where $a_k > 0$ for all k	If $\lim_{k \rightarrow \infty} a_k = 0$ and $a_{k+1} \leq a_k$ for all k , then the series converges.	8.4
Absolute Convergence	Series with some positive and some negative terms (including alternating series)	If $\sum_{k=1}^{\infty} a_k $ converges, then $\sum_{k=1}^{\infty} a_k$ converges absolutely.	8.5
Ratio Test	Any series (especially those involving exponentials and/or factorials)	For $\lim_{k \rightarrow \infty} \left \frac{a_{k+1}}{a_k} \right = L$, if $L < 1$, $\sum_{k=1}^{\infty} a_k$ converges absolutely if $L > 1$, $\sum_{k=1}^{\infty} a_k$ diverges, if $L = 1$, no conclusion.	8.5
Root Test	Any series (especially those involving exponentials)	For $\lim_{k \rightarrow \infty} \sqrt[k]{ a_k } = L$, if $L < 1$, $\sum_{k=1}^{\infty} a_k$ converges absolutely if $L > 1$, $\sum_{k=1}^{\infty} a_k$ diverges,	8.5