

Geometric Series	<i>p</i> -series	Telescoping Series	Alternating Series	
$\sum_{n=c}^{\infty} ar^n$	$\sum_{n=c}^{\infty} \frac{1}{n^p}$	$\sum_{n=c}^{\infty} \left( a_n - a_{n+1} \right)$	$\sum_{n=c}^{\infty} \left(-1\right)^n a_n$	None of these
	Show that $p > 1$		Show $\lim_{n\to\infty} [a_n] = 0$	
Show that $ \frac{ r  < 1}{\text{Sum}} = \frac{\text{first term}}{1 - \text{common ratio}} $		Show that the partial sums converge $\lim_{n\to\infty} S_n \text{ exists}$	Verify: "Alternating Series whose terms decrease in absolute value to zero."	
			Remainder ≤  next term	

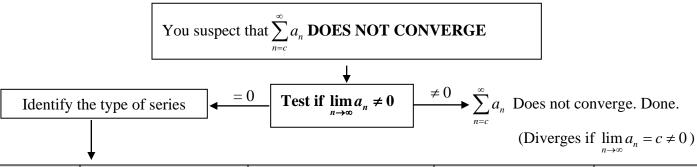
"Behaves like" Test

Integral Test	**Ratio Test**	**Root Test**	Direct Comparison Test	Limit Comparison Test
Show that all are true: $f(n) = a_n$ is 1. Positive 2. Continuous 3. Decreasing 4. $\int_0^\infty f(x)$ converges *	Show that $\lim_{n\to\infty} \left  \frac{a_{n+1}}{a_n} \right  < 1$ If the limit is one, the test is inconclusive.	Show that $\lim_{n\to\infty} \sqrt[n]{ a_n } < 1$ If the limit is one, the test is inconclusive	Write down a series $\sum_{n=k}^{\infty} b_n$ and demonstrate the following 1. $a_n, b_n > 0$ for all $n \ge k \ge c$ 2. $\sum_{n=k}^{\infty} b_n$ converges*  3. $a_n \le b_n$ for all $n \ge k$ *	Write down a series $\sum_{n=k}^{\infty} b_n$ and demonstrate: 1. $a_n, b_n > 0$ for all $n \ge k \ge c$ 2. $\sum_{n=k}^{\infty} b_n$ converges* 3. $\lim_{n \to \infty} \frac{a_n}{b_n} = L > 0$ * L must be finite and positive

<sup>\*</sup>Must be demonstrated

$$\lim_{n\to\infty} \sqrt[n]{c} = 1 \quad (c>0) \quad ; \quad \lim_{n\to\infty} \left(1 + \frac{c}{n}\right)^n = e^c \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n} = 1 \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n!} = \infty \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n^c} = 1 \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n^$$

<sup>\*\*</sup> Use these tests to determine the interval of convergence of a given power series.



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$\sum_{n=c}^{\infty} ar^n$	$\sum_{n=c}^{\infty} \frac{1}{n^p}$	$\sum_{n=c}^{\infty} (a_n - a_{n+1})$	$\sum_{n=c}^{\infty} \left(-1\right)^n a_n$	None of these
Show that $ r  \ge 1$	Show that $p \le 1$	Show that the partial sums do not converge $\lim_{n\to\infty} S_n = \pm \infty \text{ or DNE}$	Show that $\lim_{n\to\infty} [a_n] \neq 0$ or $\lim_{n\to\infty} [a_n] \to \infty \text{ or DNE}$	

"Behaves like" Test

Integral Test	Ratio Test	Root Test	<b>Direct Comparison Test</b>	Limit Comparison Test
Show that $f(n) = a_n$ is  1. Positive 2. Continuous 3. Decreasing  4. $\int_{0}^{\infty} f(x) \text{ diverges *}$	Show that $\lim_{n \to \infty} \left  \frac{a_{n+1}}{a_n} \right  > 1$ If the limit is one, the test is inconclusive.	Show that $\lim_{n\to\infty} \sqrt[n]{ a_n } > 1$ If the limit is one, the test is inconclusive	Write down a series $\sum_{n=k}^{\infty} b_n$ and demonstrate the following: 1. $a_n, b_n > 0$ for all $n \ge k \ge c$ 2. $\sum_{n=k}^{\infty} b_n$ divereges* 3. $b_n \le a_n$ for all $n \ge k$ *	Write down a series $\sum_{n=k}^{\infty} b_n$ and demonstrate:  1. $a_n, b_n > 0$ for all $n \ge k \ge c$ 2. $\sum_{n=k}^{\infty} b_n$ Diverges*  3. $\lim_{n \to \infty} \frac{a_n}{b_n} = L > 0$ * $L$ is finite and positive

<sup>\*</sup> Must be demonstrated\*

$$\lim_{n\to\infty} \sqrt[n]{c} = 1 \quad (c>0) \quad ; \quad \lim_{n\to\infty} \left(1 + \frac{c}{n}\right)^n = e^c \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n} = 1 \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n!} = \infty \quad ; \quad \lim_{n\to\infty} \sqrt[n]{n^c} = 1 \quad ; \quad \underline{\text{Growth Order:}} \quad c < \ln\left(\ln\left(n\right)\right) < \ln\left(n\right) < \left[\ln\left(n\right)\right]^c < n^c < c^n < n! < n^n < c^n < n^n < c^n < n^n < c^n < c^n < n^n < c^n < c^n$$