Summary of the convergence tests that may appear on the Calculus BC exam.

Test Name	The series …	will converge if	Or will diverge if	Comments
n^{th} –term test	$\displaystyle\sum_{n=1}^{\infty} a_n$		$\displaystyle\lim_{n\to\infty} a_n \neq 0$	For divergence only; the converse is false.
Geometric series	$\displaystyle\sum_{n=1}^{\infty} ar^{n-1}$	$-1 < r < 1$	$r \le -1$ or $r \ge 1$	Sum = $\dfrac{a}{1-r}$
Alternating series test	$\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} a_n$	$\left|a_{n+1}\right| < \left|a_n\right|$ and $\displaystyle\lim_{n\to\infty} a_n = 0$		Error bound $\left|S_\infty - S_n\right| < \left|a_{n+1}\right|$
Integral test	$\displaystyle\sum_{n=1}^{\infty} a_n$ and $a_n = f(n) \ge 0$	$\displaystyle\int_1^\infty f(x)\,dx$ converges	$\displaystyle\int_1^\infty f(x)\,dx$ diverges	f must be continuous, positive and decreasing.
p-series	$\displaystyle\sum_{n=1}^{\infty} \dfrac{1}{n^p}$	$p > 1$	$p \le 1$	
Direct comparison test	$\displaystyle\sum_{n=1}^{\infty} a_n$	$0 < a_n \le b_n$ and $\displaystyle\sum_{n=1}^{\infty} b_n$ converges	$0 < b_n \le a_n$ and $\displaystyle\sum_{n=1}^{\infty} b_n$ diverges	
Limit comparison test	$\displaystyle\sum_{n=1}^{\infty} a_n$	$a_n > 0, b_n > 0$ $\displaystyle\lim_{n\to\infty} \dfrac{a_n}{b_n} = L > 0$ and $\displaystyle\sum_{n=1}^{\infty} b_n$ converges	$a_n > 0, b_n > 0$ $\displaystyle\lim_{n\to\infty} \dfrac{a_n}{b_n} = L > 0$ and $\displaystyle\sum_{n=1}^{\infty} b_n$ diverges	
Absolute convergence implies convergence	$\displaystyle\sum_{n=1}^{\infty} a_n$	$\displaystyle\sum_{n=1}^{\infty} \left|a_n\right|$ converges	If $\displaystyle\sum_{n=1}^{\infty} \left|a_n\right|$ diverges, $\displaystyle\sum_{n=1}^{\infty} a_n$ may still converge. (Conditional convergence).	
Ratio test	$\displaystyle\sum_{n=1}^{\infty} a_n$	$\displaystyle\lim_{n\to\infty} \dfrac{\left|a_{n+1}\right|}{\left|a_n\right|} < 1$	$\displaystyle\lim_{n\to\infty} \dfrac{\left|a_{n+1}\right|}{\left|a_n\right|} > 1$	If $\displaystyle\lim_{n\to\infty} \dfrac{\left|a_{n+1}\right|}{\left|a_n\right|} = 1$ the ratio test cannot be used.

Another useful convergence tests that may be used, but not tested:

Test Name	The series …	will converge if	Or will diverge if	Comments
Root Test	$\displaystyle\sum_{n=1}^{\infty} a_n$	$\displaystyle\lim_{n\to\infty} \sqrt[n]{a_n} < 1$	$\displaystyle\lim_{n\to\infty} \sqrt[n]{a_n} > 1$	The test cannot be used if $\displaystyle\lim_{n\to\infty} \sqrt[n]{a_n} = 1$

If one test is inconclusive, try a different test. There is no single test that must be used on a given series.