The Geometric Series Test: If a series is of the form \( \sum_{n=1}^{\infty} a \cdot r^{n-1} \), then the series converges to \( \frac{a}{1 - r} \) if and only if \( |r| < 1 \).

The Integral Test: Suppose \( f(x) \) is a continuous, positive, decreasing function on \([c, \infty)\) for some \( c \geq 0\), with \( a_n = f(n) \) for all \( n \),
- If \( \int_{c}^{\infty} f(x) \, dx \) converges, then \( \sum a_n \) converges also.
- If \( \int_{c}^{\infty} f(x) \, dx \) diverges, then \( \sum a_n \) diverges also.

The Comparison Test: If \( \sum a_n \) and \( \sum b_n \) are both series with their terms all positive, and
- \( a_n \leq b_n \) with \( \sum b_n \) convergent, then \( \sum a_n \) converges also.
- \( a_n \geq b_n \) with \( \sum b_n \) divergent, then \( \sum a_n \) diverges also.

The Limit Comparison Test: If \( \sum a_n \) and \( \sum b_n \) are both series with their terms all positive, and

\[
\lim_{n \to \infty} \frac{a_n}{b_n} = L
\]

for some finite, positive number \( L \), then either both series converge or both series diverge.

The Alternating Series Test: If \( \sum a_n \) is a series for which
- the signs alternate, i.e. \( a_n \) and \( a_{n+1} \) have opposite signs for all \( n \)
- the sequence \( \{ |a_n| \} \) tends to zero, i.e. \( \lim_{n \to \infty} |a_n| = 0 \)
- the sequence \( \{ |a_n| \} \) is decreasing, i.e. \( |a_{n+1}| \leq |a_n| \) for all \( n \)

then the series converges.

The Ratio Test: If \( \sum a_n \) is a series for which

\[
\lim_{n \to \infty} \left| \frac{a_{n+1}}{a_n} \right| = L
\]

then
- if \( L < 1 \) then the series converges absolutely.
- if \( L > 1 \) (or if the limit diverges to \( +\infty \)) then the series diverges.