**The Geometric Series Test:** If a series is of the form \( \sum_{n=0}^{\infty} a \cdot r^n \), 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 \( \Sigma a_n \) and \( \Sigma b_n \) are both series with their terms all positive, and
- \( a_n \leq b_n \) with \( \Sigma b_n \) convergent, then \( \Sigma a_n \) converges also.
- \( a_n \geq b_n \) with \( \Sigma b_n \) divergent, then \( \Sigma a_n \) diverges also.

**The Limit Comparison Test:** If \( \Sigma a_n \) and \( \Sigma b_n \) 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 Ratio Test:** If \( \Sigma a_n \) 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.

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