INFINITE SERIES:
Procedures for Determining Convergence

Power Series

Is the series a power series?
$\sum_{n=0}^{\infty} c_n x^n$ *or* $\sum_{n}^{\infty} c_n (x-a)^n$

yes → Use "How to Test a Power Series for Convergence"

no ↓

***n*th term test**

Is $\lim a_n = 0$?

no → Series diverges

Yes ↓ *or maybe*

Geometric series test

Is $\sum a_n = a + ar + ar^2 + \ldots$?

yes → Series converges if $|r| < 1$.
Series diverges if $|r| \geq 1$.

no ↓

Nonnegative Terms and/or absolute convergence

Does $\sum |a_n|$ converge?
Apply one of the comparison tests, integral test, or *n*th root test to $\sum |a_n|$.

yes → Original series converges.

no ↓ *or maybe*

Alternating Series

Is $\sum a_n = b_1 - b_2 + b_3 - \ldots$?
(an alternating series)

yes → Is $b_1 \geq b_2 \geq b_3 \geq \ldots \geq b_n \geq \ldots$?

no ↓ See what you can do with the partial sums. or consult more advanced books

no → See what you can do with the partial sums. or consult more advanced books

yes → Series converges if $b_n \to 0$.
Series diverges if $b_n \not\to 0$.

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