

# Choosing a Series Convergence Test

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Following is a guideline for choosing a test for convergence for an infinite series. These are not necessarily intended to be the order in which to apply them.

- ▶ Does  $a_n$  obviously **converge to a non-zero value**?

Use the **Nth-term** test.

Note that this test is unreliable in testing for convergence.

- ▶ Is the series a **p-series**?

**Converges** if  $p > 1$ .

- ▶ Is the series a **geometric series**?

**Converges** if  $-1 < r < 1$ .

- ▶ Is the series **similar to a p- or geometric series**?

Use one of the a **Comparison** test.

In particular, if  $a_n$  is an algebraic or rational function, compare it to a p-series of known convergence or divergence

- ▶ Does the series **contain  $(-1)^n$  or  $(-1)^{n\pm 1}$** ?

Use one of the **Comparison** tests.

- ▶ Does the series have **factorials or other products**?

Use the **Ratio** test.

- ▶ Is  $a_n$  of the form  **$(b_n)^n$** ?

Use the **Root** test.

- ▶ Is the **integral of  $a_n$  easily evaluated**?

Use the **Integral** test.