

## CHOOSING THE RIGHT CONVERGENCE TEST

In calculus, it is important to be able to determine whether a series converges or diverges. There are several different tests that can be used for this. Students should be able to quickly determine the best test to use, since choosing the wrong test will usually lead to the test failing. For the following infinite series choose which of the following tests to use to determine convergence or divergence. The answers are on the back.

Divergence Test (D)	Integral Test (I)	Ratio Test (Ra)
p-Series (P)	Direct Comparison (C)	Root Test (Ro)
Geometric Series (G)	Limit Comparison (L)	Alternating Series Test (A)

1.  $\sum \frac{n(n+4)}{(n-2)(n+3)}$
2.  $\sum \frac{\cos \pi n}{n}$
3.  $\sum \frac{4^n}{1+3^n}$
4.  $\sum \frac{\sqrt{n^2+1}}{n^3-2n+3}$
5.  $\sum \sqrt[3]{\frac{1}{n^2}}$
6.  $\sum \left(\frac{5+4n}{4+5n}\right)^n$
7.  $\sum \frac{n^2}{n^5}$
8.  $\sum \frac{(-1)^n}{\sqrt{n}}$
9.  $\sum \frac{2^n+n^3}{n^2+3^n}$
10.  $\sum \frac{\cos \pi n}{3^n}$
11.  $\sum \frac{50^n}{2^n n!}$
12.  $\sum \frac{1}{n\sqrt{n}}$
13.  $\sum (-1)^n \frac{n^2}{n(n-1)}$
14.  $\sum \frac{1}{n \ln n}$
15.  $\sum \frac{n! n!}{(2n)!}$
16.  $\sum \frac{\left(2+\frac{1}{n}\right)^n}{n^n}$
17.  $\sum \frac{\ln n}{n}$
18.  $\sum \frac{\arctan n}{n}$
19.  $\sum \frac{2+\cos n}{n}$
20.  $\sum \frac{3^n}{2^{2n}}$
21.  $\sum \frac{n-1}{\sqrt{n^3-2n^2+7}}$
22.  $\sum \frac{n!}{n^n}$
23.  $\sum e^{\frac{4}{n}}$
24.  $\sum \frac{1}{1.1^{n+n}}$
25.  $\sum (-1)^n \frac{1}{2^{n/2}}$
26.  $\sum \frac{e^{5/n}}{n^2}$
27.  $\sum \frac{4-\sin n}{n^2}$
28.  $\sum \frac{(2n)!}{n! n!}$
29.  $\sum \frac{1}{n \ln n \ln \ln n}$
30.  $\sum \frac{(-1)^n}{2^n - 1}$

**Answers:**

1	D	7	P	13	D	19	C	25	A
2	A	8	A	14	I	20	G	26	L
3	D	9	L	15	Ra	21	L	27	C
4	L	10	A	16	Ro	22	Ra	28	Ra
5	P	11	Ra	17	I	23	D	29	I
6	Ro	12	P	18	L	24	L	30	A