Infinite Series

Limit Comparison Test

→ When do you use it?

→ How do you use it?

Use for $\sum_{n=1}^{\infty} a_n$ when you can't use comparison test

Find b_n: By comparing the degree in top & bottom.

converges: If b_n converges & $\lim_{n\to\infty} \frac{a_n}{b_n} > 0$

diverges: If b_n diverges & $\lim_{n\to\infty} \frac{a_n}{b_n} > 0$

Infinite Series

Use the limit comparison test to determine if $\sum_{n=1}^{\infty} \frac{n^2}{n^4-n}$ converges or diverges.

$\sum_{n=1}^{\infty} \frac{n^2}{n^4-n}$ $\quad \frac{n^2}{n^4} = \frac{1}{n^2}$ $\quad \frac{1}{n^2} < \frac{n^2}{n^4-n}$

smaller so can't use comparison.

$b_n = \frac{1}{n^2}$ converges by p-series $p = 2 > 1$.

$$\lim_{n\to\infty} \frac{n^2}{n^4-n} \cdot \frac{n^2}{1} = \lim_{n\to\infty} \frac{n^4}{n^4-n} = 1 > 0$$

$\therefore \sum_{n=1}^{\infty} \frac{n^2}{n^4-n}$ converges by limit comparison test.