Math 426.2SY
Calculus II

University of New Hampshire

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Outline

The ComparisonTest

Let $\sum a_n$ and $\sum b_n$ be series with nonnegative terms. Suppose that for some integer N

$$a_n \leq b_n, \quad \text{for all} \quad n > N$$

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- If $\sum b_n$ converges, then $\sum a_n$ also converges.
- If $\sum a_n$ diverges, then $\sum b_n$ also diverges.

The ComparisonTest

Example

Determine if the series $\displaystyle\sum_{n=2}^{\infty} \frac{1}{\sqrt{n}-1}$ converges.

The Limit ComparisonTest

Suppose that $a_n > 0$ and $b_n > 0$ for all $n \geq N$ (N an integer). If

$$\lim_{n \to \infty} \frac{a_n}{b_n} = c, \quad c > 0, \quad \text{c is a real number}$$

Then $\sum a_n$ and $\sum b_n$ both converge or both diverge.

The Limit ComparisonTest

Example

Determine if the series $\displaystyle\sum_{n=1}^{\infty} \frac{n(n+1)}{(n^2+1)(n-1)}$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=1}^{\infty} \sqrt{\frac{n+4}{n^4+4}}$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^n - 1}$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=1}^{\infty} \sin(\frac{1}{n})$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n3^n}$ converges.

ComparisonTests

Example

Determine if the series $\sum_{n=1}^{\infty} \dfrac{\ln(n)}{n}$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=1}^{\infty} \frac{\ln(n)}{n^2}$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=2}^{\infty} \frac{1}{\ln(n)}$ converges.

ComparisonTests

Example

Determine if the series $\displaystyle\sum_{n=2}^{\infty} \frac{1}{\sqrt{n}\ln(n)}$ converges.