Math 426.2SY
Calculus II

University of New Hampshire

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Outline

Introduction

Question

Determine if the series $\sum_{n=1}^{\infty} \frac{1}{n}$ and $\sum_{n=1}^{\infty} \frac{1}{n^2}$ converge or diverge.

Cont'd

Idea

cont'd

The Integral Test

Suppose that $f(x)$ is continuous, positive and non-increasing for all $x > N$.

Then $\int_N^\infty f(x)\,dx$ and $\sum_{n=N}^{\infty} f(n)$ either both converge or they both diverge.

The Integral Test

Example

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

The Integral Test

Example

$$\sum_{n=1}^{\infty} \frac{1}{n^2}$$

The Integral Test

Example

$$\sum_{n=1}^{\infty} \frac{1}{n^p}$$

The Integral Test

Example

Determine if the series $\sum_{n=1}^{\infty} \frac{3}{\sqrt{n}}$ converges.

The Integral Test

Example

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

The Integral Test

Example

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

The Integral Test

Example

Determine if the series $\sum_{n=0}^{\infty} e^{-n^2}$ converges.

The Integral Test

Example

Determine if the series $\sum_{n=0}^{\infty} \frac{n}{n+1}$ converges.

The Integral Test

Example

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

The Integral Test

Example

Determine if the series $\sum_{n=0}^{\infty} \frac{1}{(\ln 3)^n}$ converges.