

Calculus II

Comparison and limit-comparison tests, part 1

Todor Milev

2019

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} \quad \frac{5}{2n^2}$$

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- This is a constant times a p -series with $p =$

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- This is a constant times a p -series with $p = 2 > 1$.

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- This is a constant times a p -series with $p = 2 > 1$.
- Therefore $\sum_{n=1}^{\infty} \frac{5}{2n^2}$ is

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- This is a constant times a p -series with $p = 2 > 1$.
- Therefore $\sum_{n=1}^{\infty} \frac{5}{2n^2}$ is convergent.

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- This is a constant times a p -series with $p = 2 > 1$.
- Therefore $\sum_{n=1}^{\infty} \frac{5}{2n^2}$ is convergent.
- Therefore $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ is by the Comparison Test.

Example

Determine if $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ converges or diverges.

- As $n \rightarrow \infty$, the dominant term in the denominator is $2n^2$, so compare with $\frac{5}{2n^2}$.

$$\frac{5}{2n^2 + 7n + 3} < \frac{5}{2n^2}$$

$$\sum_{n=1}^{\infty} \frac{5}{2n^2} = \frac{5}{2} \sum_{n=1}^{\infty} \frac{1}{n^2}$$

- This is a constant times a p -series with $p = 2 > 1$.
- Therefore $\sum_{n=1}^{\infty} \frac{5}{2n^2}$ is convergent.
- Therefore $\sum_{n=1}^{\infty} \frac{5}{2n^2+7n+3}$ is convergent by the Comparison Test.