Calculus

10.9 Absolute or Conditional Convergence

Notes

Write your questions and thoughts here!

Three possibilities with regards to the series $\sum_{n=1}^{\infty} a_n$ dealing with convergence or divergence.

1. **Converges Absolutely.** If $\sum_{n=1}^{\infty} |a_n|$ converges, then the original series $\sum_{n=1}^{\infty} a_n$ also converges.
2. **Converges Conditionally.** If $\sum_{n=1}^{\infty} |a_n|$ diverges, but the original series $\sum_{n=1}^{\infty} a_n$ converges.
3. **Divergent.** Both $\sum_{n=1}^{\infty} |a_n|$ and $\sum_{n=1}^{\infty} a_n$ diverge.

Find if the series converges absolutely, converges conditionally, or is divergent.

1. $\sum_{n=1}^{\infty} \frac{(-3)^n}{n!}$

2. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[3]{n}}$

3. $\sum_{n=1}^{\infty} (-1)^n \frac{n}{n+2}$

Write your questions and thoughts here!

Find the values of x that make the series converge absolutely.

4. $\sum_{n=1}^{\infty} \frac{(-1)^n n(x+4)^n}{6^n}$

5. $\sum_{n=1}^{\infty} \frac{(x-1)^n}{n}$

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Practice

1. Which of the following series are conditionally convergent?

I. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^4}$ II. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ III. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt[3]{n}}$

A. I only B. I and II only C. I and III only D. II and III only

Determine whether the series converges absolutely, converges conditionally, or diverges.

2. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(n^2+8)}{\pi^n}$

3. $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n}$

4. $\sum_{n=1}^{\infty} \frac{(-1)^n n^2}{(n+1)^2}$

5. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{\frac{5}{2}}}$

6. For which values x is the series $\sum_{n=1}^{\infty} \frac{nx^n}{4^n(n^2+1)}$ conditionally convergent?

A. $x = 4$ B. $x = -4$ C. $x > 4$ D. $-4 < x < 4$

7. Which of the following statements is true about the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^{1/3}}$.

A. The series converges conditionally.

B. The series converges absolutely.

C. The series converges but neither conditionally nor absolutely.

D. The series diverges.

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8. Which of the following statements about the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{1+n^{3/2}}$ is true?

A. The series converges conditionally.

B. The series converges absolutely.

C. The series converges but neither conditionally nor absolutely.

D. The series diverges.

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9. Which of the following statements about the series $\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n}$ is true?

I. Converges Absolutely II. Diverges III. Converges Conditionally

A. I only B. II only C. III only D. I and III only

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10. For what values of x is the series $\sum_{n=1}^{\infty} \frac{n(x+5)^n}{7^n}$ absolutely convergent?

A. $x = -12$ B. $x = 2$ C. $x > 2$ D. $-12 < x < 2$

No test prep for this lesson.