11.7 Strategy for Testing Series

Solutions online. Note the Question numbers are most likely out of date.

Are the following series absolutely convergent, conditionally convergent, or divergent?

Example 11.7.1 $\displaystyle\sum_{n=1}^{\infty} \frac{n^2-1}{n^2+n}$

Example 11.7.4 $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} \frac{n-1}{n^2+n}$

Example 11.7.6 $\displaystyle\sum_{n=1}^{\infty} \left(\frac{3n}{1+8n}\right)^n$

Example 11.7.9 $\displaystyle\sum_{n=1}^{\infty} \frac{n}{e^n}$

Example 11.7.14 $\displaystyle\sum_{n=1}^{\infty} \frac{n^2+1}{n^3+1}$

Example 11.7.17 $\displaystyle\sum_{n=1}^{\infty} \frac{3^n}{5^n+n}$

Example 11.7.23 $\displaystyle\sum_{n=1}^{\infty} (-1)^n 2^{1/n}$

Example 11.7.25 $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{\sqrt{n}}$

Example 11.7.31 $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{(2n+1)!}$

Example 11.7.30 $\displaystyle\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$

Practice Test Question

Solutions online. Study more than just these questions! There can be other types of questions on the test.

1. The nth partial sum of a series $\sum_{n=1}^{\infty} a_n$ is $s_n = \dfrac{n-1}{n+1}$. Find a_n. Find $\sum a_n$.

2. Draw diagrams **and clearly explain** the Remainder Estimate for the Integral Test:

$$\int_{n+1}^{\infty} f(x)\,dx \leq R_n \leq \int_{n}^{\infty} f(x)\,dx.$$

(Make sure you include the details of the integral test itself in your answer)

3. Test the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^n - 1}$ for convergence or divergence using the limit comparison test.

4. Is $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ absolutely convergent, conditionally convergent, or divergent? Explain.

5. Test the series $\displaystyle\sum_{n=1}^{\infty} e^{-n} n!$ for convergence or divergence using the ratio test.

6. Find the **exact** sum of $\displaystyle\sum_{n=4}^{\infty} \frac{1}{(n-3)(n-1)}$ using partial fractions.

7. If the nth partial sum of a series $\sum a_n$ is given by $s_n = 3 - ne^{-n}$, find $\sum a_n$.

8. Show that series $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{6n^2 + 4}$ diverges.

9. Is the series $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{n}$ absolutely convergent, conditionally convergent, or divergent?