Choosing a Convergence Test Worksheet

MTH 202A - Fall 2022 - University of Portland

Instructions: Provide complete solutions for each problem. Show steps clearly and write your solutions with standard mathematical notations.

Goals:

- To develop intuition on which convergence test to use given a series.

For each of the following series, guess if it diverges, converges conditionally or converges absolutely. Keep in mind that you must answer two separate questions: 1. Does the series converge? and 2. Does the series converge absolutely? Name the test(s) you would use to answer each of these questions. Usually you are required to give a detailed solution, but for this worksheet, just briefly describe your overall strategy.

1. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n(n+\frac{1}{2})}{n-\frac{1}{2}}$
2. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n n}{e^n}$
3. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^3+n}$
4. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n \ln(n)}{n^2}$
5. $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n(n^3+1)}{(n^4+n-4)}$
6. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt[n]{n^7+n}}{\sqrt{n^9+n^5}}$
7. $\displaystyle\sum_{n=1}^{\infty} \sqrt{n}2^{n+1}$
8. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln(n)}}$
9. $\displaystyle\sum_{n=2}^{\infty} \frac{n(-2)^n}{n!}$
10. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n n!}{e^{n^2}}$