

MA 114 Worksheet # 5: Absolute and Conditional Convergence

1. Conceptual understanding:

(a) Let $a_n = \frac{n}{3n+1}$. Does $\{a_n\}$ converge? Does $\sum_{n=1}^{\infty} a_n$ converge?

(b) Give an example of a divergent series $\sum_{n=1}^{\infty} a_n$ where $\lim_{n \rightarrow \infty} a_n = 0$.

(c) Does there exist a convergent series $\sum_{n=1}^{\infty} a_n$ which satisfies $\lim_{n \rightarrow \infty} a_n \neq 0$? Explain.

(d) When does a series converge absolutely? When does a series converge conditionally?

(e) State the Leibniz test for alternating series.

2. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[5]{n}}$

(b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n+1)}$

(c) $\sum_{n=1}^{\infty} 13 \cos(5)^{n-1}$

3. Identify the following statements as true or false. If the statement is true, cite evidence from the text to support it. If the statement is false, correct it so that it is a true statement from the text.

(a) To prove that the series $\sum_{n=1}^{\infty} a_n$ converges you should compute the limit $\lim_{n \rightarrow \infty} a_n$. If this limit is 0 then the series converges.

(b) One way to prove that a series is convergent is to prove that it is absolutely convergent.

(c) An infinite series converges when the limit of the sequence of partial sums converges.