MA 425-002 Problems on Infinite Series

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1. Section 9.1, problem 7a.
2. Section 9.1, problem 12.
4. Use the integral test to show that the series \( \sum_{n=1}^{\infty} \frac{1}{n^p} \) converges if \( p > 1 \) and diverges if \( 0 < p \leq 1 \).
6. Let \( \sum_{n=1}^{\infty} x_n \) be a series with positive terms. Suppose \( \lim_{n \to \infty} \frac{x_n}{x_{n+1}} = r \) with \( r < 1 \). Let \( r < r_1 < 1 \), let \( s_n \) denote the \( n \)th partial sum of the series, and let \( s \) denote the sum of the series. Show there exists an integer \( N \) such that for all \( n \geq N \), \( s - s_n < \frac{x_{n+1}}{1-r_1} \).