

Mathematical Analysis I

Quiz on Chapter: *Numerical Sequences and Series*

Time: 1 hour and 30 minutes

Fall 2025

Questions:

1. Suppose $\{p_n\}$ is a Cauchy sequence in a metric space X , and some subsequence $\{p_{n_k}\}$ converges to a point $p \in X$. Prove that the full sequence $\{p_n\}$ converges to p .
2. For which values of p does the series

$$\sum_{n=2}^{\infty} \frac{1}{n(\log n)^p}$$

converge, and for which values does it diverge?

3. Find the radius of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{n^3}{3^n} z^n.$$