

SUMMER WORKSHOP IN MATHEMATICS

(SWIM@KSOM - 2025)

Analysis

(Problem Sheet 5)

1. Prove that convergent sequences are Cauchy.
2. Prove that Cauchy sequences are bounded.
3. Prove that Cauchy sequences are convergent.
4. Prove that the series $\sum_{n=1}^{\infty} \frac{1}{n}$ diverges.
5. Prove that the series $\sum_{n=0}^{\infty} \frac{1}{n!}$ converges to an irrational number
6. Let $f, g : \mathbb{R} \rightarrow \mathbb{R}$ be continuous at x_0 . Prove the following are continuous at x_0
 - (a) $f + g$.
 - (b) fg .
 - (c) f/g provided $g(x_0) \neq 0$.
 - (d) $f \circ g$