SUMMER WORKSHOP IN MATHEMATICS

(SWIM@KSOM - 2025)

Analysis

(Problem Sheet 4)

---

1. Give an example of an unbounded sequence that has a convergent subsequence.
2. Let $\{x_n\}$ be a sequence of real numbers. Which of the following are true?
   (a) All subsequnces of x_n converges implies x_n also converges.
   (b) All convergent subsequences of x_n converges to x implies x_n converges to x.
   (c) Any subsequence of x_n has a subsequence converges to x, then x_n converges to x.
   (d) $\{x_n\}$ is bounded and all of its convergent subsequences converges to x, implies x_n conveges to x.
3. Construct a sequence $\{x_n\}$ such that for any natural number N, there exits a subsequence of $\{x_n\}$ converging to N.