

# SUMMER WORKSHOP IN MATHEMATICS

(SWIM@KSOM - 2025)

## Analysis

(Problem Sheet 4)

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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 subsequences of  $x_n$  converges implies  $x_n$  also converges.
  - (b) All subsequences of  $x_n$  converges to  $x$  implies  $x_n$  converges to  $x$ .
  - (c) All convergent subsequences of  $x_n$  converges to  $x$  implies  $x_n$  converges to  $x$ .
  - (d) Any subsequence of  $x_n$  has a subsequence converges to  $x$ , then  $x_n$  converges to  $x$ .
  - (e)  $\{x_n\}$  is bounded and all of its convergent subsequences converges to  $x$ , implies  $x_n$  converges to  $x$ .