## 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 subsequeces 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  $x_n$  converges 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.