

Sections 3.3 Monotone Sequences

A sequence (x_n) is increasing if $x_n \leq x_{n+1} \forall n \in \mathbb{N}$; (x_n) is decreasing if $x_n \geq x_{n+1} \forall n \in \mathbb{N}$. (x_n) is monotone if it is increasing or decreasing.

Monotone Convergence Theorem A monotone sequence of real numbers is convergent if and only if it is bounded. Further:

- a) If (x_n) is a bounded, increasing sequence, then $\lim_{n \rightarrow \infty} x_n = \sup\{x_n : n \in \mathbb{N}\}$.
- b) If (x_n) is a bounded, decreasing sequence, then $\lim_{n \rightarrow \infty} x_n = \inf\{x_n : n \in \mathbb{N}\}$.