# Outline: Week 2 T

1. Monotone convergence theorem proof
2. Nested intervals lemma
3. limit superior; Prove that $b_n := \sup\{a_k : k \geq n\}$ converges.
4. Exercise 2.6.B: If $a_{n+1} = \sqrt{5 + a_n}$ with $a_1 = 0$, show that $a_n$ converges to L satisfying $L^2 - 5 - L = 0$.
5. Introduction of subsequences
6. Bolzano-Weierstrass theorem proof
7. Exercise 2.7.I: the Cantor diagonalization argument to get $|x_{n_k} - L| < 1/k$. For example, $\{\frac{n}{m+n} : m, n \in \mathbb{N}^+\}$ attain any limit $\{1, \frac{1}{2}, ..., 0\}$.