1. Do problems 11.1, 11.6 in the textbook.

2. Let $(s_n)$ be a sequence. A real number $s$ is called an accumulation point of $(s_n)$ if for each $\varepsilon > 0$ there are infinitely many $n$ such that $|s_n - s| < \varepsilon$. In class we proved that this is equivalent to the existence of a subsequence of $(s_n)$ converging to $s$.

   (a) Prove that a bounded sequence with exactly one accumulation point must converge. Can the requirement that the sequence is bounded be dropped?

   (b) Suppose $(s_n)$ is bounded. The Bolzano-Weierstrass Theorem states that $(s_n)$ has at least one accumulation point. The limit superior of $(s_n)$ is defined as

   \[ \limsup s_n := \sup \{ s : s \text{ is an accumulation point of } (s_n) \} \]

   Show that if $\limsup s_n < a$ then there is some $n_0$ such that $s_n < a$ for all $n \geq n_0$.


4. Extra credit: 14.7 in the textbook.