1. Let \((M, d)\) be a metric space and \(X \subset M\). Suppose the metric space \((X, d')\) with the reduced metric is complete. Show that \(X\) is closed in \((M, d)\).

2. Let \(\{a_n\}\) and \(\{b_n\}\) be bounded real sequences. Show that
\[
\limsup_{n \to \infty} (a_n + b_n) \leq \limsup_{n \to \infty} a_n + \limsup_{n \to \infty} b_n.
\]

3. Prove that the set \(B = \{x \in \ell^\infty | \|x\|_{\ell^\infty} \leq 1\}\) is not compact in \(\ell^\infty\).

4. Let \(X\) be a subset of a metric space \(M\). Prove that
\[
\overline{X} = \{x \in M | \forall \varepsilon > 0 : B_\varepsilon (x) \cap X \neq \emptyset\}
\]