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Solutions for these problems are only presented during the Problem Solving Sessions W5-6 in SS 2135. You are strongly encouraged to work through the problems ahead of time, and our TA Yiannis will cover the questions you are most interested in. These sessions are very valuable at developing the proper style to present cogent and rigorous mathematical solutions.

Problems:

1. After reading the posting in "Optional Readings" on "Quantifiers", do problems 2.14, 2.16, 2.17

2. Prove that $A \subseteq B$ implies that $\overline{A} \subseteq \overline{B}$

3. Section 1.2 questions 1 and 9.

4. In class we showed that for a function $f : \mathbb{R}^n \to \mathbb{R}^k$ the set $f^{-1}(U) := \{\mathbf{x} \mid f(\mathbf{x}) \in U\}$, known as the preimage or inverse image of $U \subseteq \mathbb{R}^k$, is well behaved with respect to unions, namely that $f^{-1}(U \cup V) = f^{-1}(U) \cup f^{-1}(V)$. Devise and prove analogous relations for intersection, compliment and subset.