1. Let $A$ be any infinite set and let $D$ be a countable set. Prove that
   \[ \text{card}(A) = \text{card}(A \cup D). \]

2. Royden, p. 58, \#8

3. In each of the following a function $\mu$ is defined on the subsets of a given set. Determine whether the function is an outer measure.

   (a) Let $X$ be a $10 \times 10$ array, and for $S \subseteq X$ let $\mu(S)$ be the number of columns of $X$ containing an element of $S$.

   (b) Let $X = \mathbb{N}$ and for $E \subseteq X$ let
   \[ \mu(E) = \limsup_{n \to \infty} \frac{1}{n} \text{card}(E \cap \{1, 2, \ldots, n\}). \]