1. Show that the Cantor set is a uncountable measure zero set.

2. Let \( \{R_j\}_{j=1}^N \) be non-overlapping rectangles, then \( |\bigcup_{k=1}^N R_j| = \sum_{j=1}^N |R_j| \).

3. Let \( A \) and \( B \) two disjoint compact sets of \( \mathbb{R}^n \). Show that \( \text{dist}(A, B) > 0 \).

4. Prove that every open set in \( \mathbb{R}^n \) can be written as a countable union of non-overlapping (closed) cubes.

5. Prove that outer measure is translation invariant, i.e., if \( E_h = \{x + h; x \in E\} \) is the translate of \( E \) by \( h \in \mathbb{R}^n \), then \( |E + h|_e = |E|_e \).

6. Let \( Z \) be a subset of \( \mathbb{R}^1 \) with measure zero. Show that the set \( \{x^2 : x \in Z\} \) also has measure zero.