Math 131
Homework 1

Read Chapter 1 of Rosenlicht

1. Do problems 7 and 8 on page 12 of Rosenlicht

2. Let $X_1, ..., X_n$ be sets. We define the Cartesian product of these sets as
   $X_1 \times X_2 \times \cdots \times X_n = \{(x_1, x_2, ..., x_n) | x_i \in X_i\}$. Prove that if each of the sets $X_1, ..., X_n$ is countable, then $X_1 \times \cdots \times X_n$ is countable.

3. Prove that the set of all subsets of the naturals is uncountable.

4. Prove that there is a bijection between the sets $[0, 1]$ and $(0, 1)$. 