Problem 99: Let $A, B$ be two nonempty countable sets. Show that $A \cup B$ is countable. 
(Hint: Consider first the case where $A$ and $B$ are disjoint, then work on the general case.)

Problem 100: Show that the set of irrational numbers is uncountable.

Problem 101: Prove that $A$ is uncountable if and only if $A \times A$ is uncountable. Conclude that the Euclidean space $\mathbb{R}^n$ is uncountable.