Exercise 1. Let S be a set and $A \subset S$. Prove that if both A and $S \setminus A$ are countable, then S is countable. [*Suggestion:* Note that $S = A \cup (S \setminus A)$.]

Exercise 2. In class we showed that $\mathbb{Q}^+$ is countable. Use this and another result proven in class to show that $\mathbb{Q}$ is countable.

Exercise 3. Prove that $\mathbb{R} \setminus \mathbb{Q}$ is uncountable. Conclude that there are "more" irrational numbers than rational numbers. [*Suggestion:* See Exercise 1.]