Problem 1. Prove if $a, b \in \mathbb{R}$ and ab is irrational, then at least one of a or b is irrational.

Problem 2. Let $n \in Z$. Prove that if n^2 is divisible by 3, then n is divisible by 3.

Problem 3. Prove that $\sqrt{2} + \sqrt{3}$ is irrational. [*Hint*: Suppose it were. Try solving for $\sqrt{3}$.]

Problem 4. We proved the statement "*if n^2 is even, then n is even*" using the contrapositive. Alternatively, write a proof of this by contradiction.