MATH 241: ANALYSIS IN SEVERAL REAL VARIABLES I
PROOF PARTY

Problem 1. Let $x \in \mathbb{Q}$ and let $y \in \mathbb{R}$ with $y \notin \mathbb{Q}$. Prove that if $x \neq 0$ then $xy \notin \mathbb{Q}$.

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Problem 2. Let A, B be nonempty subsets of $\mathbb{R}$ with $A \subseteq B$. Suppose that B is bounded above. Prove that $\sup A \leq \sup B$.

Problem 3. Prove that $n^2 \leq n!$ for all $n \geq 4$.

Problem 4. Let A, B be sets. Suppose that B is uncountable and that there exists a surjective map $f : A \to B$. Prove that A is uncountable.