Name _____

Problem 1. Let $A = \{5k : k \in \mathbb{N}\}$. Prove $|A| = |\mathbb{N}|$ by constructing an explicit bijection between A and $\mathbb{N}$ and proving that it is indeed a bijection.

Problem 2. Assume A and B are two non-empty sets such that $A \cap B = \emptyset$. Assume $|A| = n$ for some $n \in \mathbb{N}$ and $|B| = |\mathbb{N}|$. Prove that $|A \cup B| = |\mathbb{N}|$.

For this problem specify and explicit bijection between $A \cup B$ and $\mathbb{N}$, but you do not need to prove it is a bijection in a rigorous way.

Problem 3. Assume A and B are two non-empty sets such that $A \cap B = \emptyset$. Assume $|A| = \mathbb{N}$ and $|B| = |\mathbb{N}|$. Prove that $|A \cup B| = |\mathbb{N}|$.

For this problem specify and explicit bijection between $A \cup B$ and $\mathbb{N}$, but you do not need to prove it is a bijection in a rigorous way. Looking at the proof we did in class for $|\mathbb{N}| = |\mathbb{Z}|$ might be useful.