Name:	
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1. (10 points) Let $S=\{n\in\mathbb{N}\ :\ x^n+y^n=z^n\ \text{has an integer solution}\}.$ Prove that the set S is enumeratable.

2. (10 points) Let $A, B \subseteq \mathbb{N}$ be enumeratable. Show that $A \cup B$ is also enumeratable.

3. (10 points) We say that a real number α be computable iff there is a computable function $a: \mathbb{Q} \to \mathbb{Q}$ such that $|\alpha - a(\epsilon)| \leq \epsilon$ for any rational $\epsilon > 0$.

Show that a number $\alpha < 1$ is computable iff the function $f : \mathbb{N} \to \{0, 1, \dots, 9\}$ such that f(i) is the *i*th digit of the base-10 representation of α is computable.

4. (10 points) Let $X, A, B \subseteq \mathbb{N}$ such that $X = A \Delta B$ (X is the symmetric difference of A and B) and A and B are enumeratable. Prove that there are $A', B' \subseteq \mathbb{N}$ such that $X = A' \setminus B'$ and A' and B' are enumeratable.