Theory of Computation

Homework 2
Due: 2008/04/10

Problem 1. Let $L \subseteq \{0,1\}^n$ be a non-recursive language. Define $L' = \{0x \mid x \in L\}$ where $0x$ denotes the concatenation of 0 and x. Show that L' is non-recursive.

Problem 2. Let $L \subseteq \{0,1\}^*$ be a recursive language satisfying $|L \cap \{0,1\}^n| = 2$ for each $n \in \mathbb{N}$. Prove the existence of a non-recursive language $L' \subseteq L$. (Hint: You may want to show that L has uncountably many subsets. But any other methods are also welcomed.)