EECS 343: Theoretical Computer Science, Homework Exercise 9
due Monday, March 30, 2020 before class

Problem 1: (Sipser 7.18) Show that if P = NP, then every language $A \in P$, except $A = \emptyset$ and $A = \Sigma^*$, is NP-complete.

Problem 2: (Sipser 7.21b) Let G represent an undirected graph.
Let LPATH $= \{\langle G, a, b, k\rangle \mid G$ contains a simple path of length at least k from a to $b\}$. Prove that LPATH is NP-complete.

Problem 3: (Sipser 7.30) Let SET-SPLITTING $= \{\langle S, C\rangle\}$ where S is a finite set of n elements and $C = \{C_1, \ldots, C_k\}$ is a collection of k subsets of S, and we can color the elements of S *red* or *blue* so that no subset $C_i \in C$ contains only elements of one color. Prove that SET-SPLITTING is NP-complete.