CS 682 (Spring 2001) - Assignment 1
Due: February 7, 2001

(1) Prove that
$$\{M_i \mid L(M_i) \text{ is not a regular set}\}$$
is a productive set.

(2) Let $F(n) = n!^{n!}$. Prove that there exists a minimal finite automaton A_i and a Turing machine M_j such that
$$L(A_i) = L(M_j) \qquad \text{and} \qquad F(|M_j|) < |A_i|.$$

(3) Define
$$\text{ECO}_{\frac{1}{2}} = \{M_i \mid 2|M_j| < |M_i| \implies L(M_i) \neq L(M_j)\}.$$
Prove that $\text{ECO}_{\frac{1}{2}}$ is an immune set.