CS 682 Homework #2
Due February 14, 2001

1. Show that there exists a TM, M_i, such that
$$L(M_i) = \{M_i\}.$$

2. Let $\mathcal{L}_i$ denote linearly-bounded automata. Show that
$$\{\mathcal{L}_i \mid L(\mathcal{L}_i) \neq \Sigma^*\}$$
is an r.e. complete set.

3. Show that
   a) $\{\mathcal{L}_i \mid L(\mathcal{L}_i) \text{ is cofinite}\} \equiv_m \{M_i \mid L(M_i) \text{ is finite}\}$
   b) $\{\mathcal{L}_i \mid L(\mathcal{L}_i) \text{ is not regular}\} \equiv_m \{M_i \mid L(M_i) \text{ is infinite}\}$.

4. Let $A = \{M_i \mid |L(M_i)| = 2\}$. Show that
   a) $A \leq_m \{M_i \mid L(M_i) \text{ is finite}\}$
   b) $A \leq_m \{M_i \mid L(M_i) \text{ is infinite}\}$.