CS 682 Homework #7
Due April 18, 2001

1. Let $MING = \{G_i \mid G_i \; cfg$ and $(\forall j < i) \; [L(G_i) \neq L(G_j)]\}$ and $\Delta = \{M_i \mid M_i \; (-) \; \Downarrow\}$. Show that there exists a total $M_{i_o}^{MING}$ such that

$$\Delta = L(M_{i_o}^{MING});$$

that is, Δ is recursive in $MING$ or, stated differently, $\Delta \leq_m^T MING$, Δ is Turing redicible to $MING$.

2. Prove that $\{M_i \mid L(M_i)$ is not regular and $L_i(n) \leq log \; log \; n\}$ is a Π_2-complete set.

3. Consider k-head finite automata, $k \geq 1$. The k heads are read-only and they can move independently on the input in either direction.

   Prove that $\{L(k - FA) \mid k \geq 1\} = SPACE[log \; n]$.