Math 441, Computability and Logic

Midterm Exam 2, Spring 2000

CHOOSE 4 QUESTIONS.
REMARK: QUOTE ALL THEOREMS YOU ARE APPLYING.

1.a) Define the equivalence relation $\approx_L$ for a language $L \subseteq \Sigma^*$.
1.b) Describe the minimal deterministic finite automaton(i.e., with minimal number of states) which accepts a regular language L.

2) Show that $L = \{w \in \{a, b\}^* \mid$ the number of a-s appears in w is greater than the number b-s appears in w $\}$ is not regular.

3) Show that $L = \{w \in \{0, 1, ..., 9\}^* \mid w$ is a decimal notation for a number divisible by 6 $\}$ is regular.

4) Find the standard deterministic finite automaton which accepts the language $L = \{w \in \{a, b\}^* \mid$ aba is a substring of $w\}$.

5) Prove or refute: If L is regular then $L' = \{xy \mid x \in L$ and $y \notin L\}$ is regular.