CS 3350 Spring 2011 midterm exam

1. (20 pts) Give an example of each of the following. In all questions, the alphabet is $\{a, b\}$. If no example exists, answer "impossible". No justification needed.

   (a) A suffix of $abbb$ of length 0.

   (b) A string w where $|w|_a = |w|_b$.

   (c) A finite automaton with two final states for the language $\{a\}$.

   (d) A finite automaton with no final state for the language $\{a\}$.

   (e) A GNFA that is not a NFA.

   (f) A regular expression containing union, concatenation and Kleene star, for a finite language.

   (g) A finite automaton where $\delta(q_1, a) = q_2$.

   (h) A NFA with $K = \{q_0, q_1, q_2\}$ and $\delta(q_1, a) = K$.

   (i) Two different equivalent regular expressions.

   (j) Two different languages L_1 and L_2 such that $L_1 \subset L_2$.

2. (20 pts) Construct a finite automaton for the set of all strings that start and end with b and has an even number of a's. (Examples of strings in the language: b, bb, $bbabab$. Examples of strings not in the language: ε, baa, $baaab$, $bbabb$.)

3. (20 pts) Problem on transforming DFA to regular expression

4. (20 pts) A Nondeterministic Finite Automaton for a languages L_1 was given. (I lost the original question) Construct a Nondeterministic Finite Automaton that accepts the Kleene star of the languages: L_1^*.

5. (20 pts) A Nondeterministic Finite Automaton for a language L was given. (I lost the original question) Construct a Deterministic Finite Automaton for L.