CS 361 – Homework 2

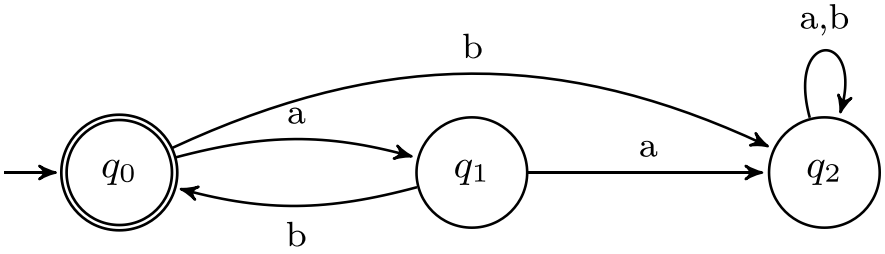
Total possible points: 65

1. (10 points) Let M_1 be the FA defined by $Q = \{q_0, q_1, q_2\}, \Sigma = \{1,2\}, F = \{q_0, q_2\}$, and δ:

δ	*1*	*2*
q_0	q_0	q_1
q_1	q_2	q_1
q_2	q_2	q_0

   a. Give the *state diagram* of M_1.
   b. *Trace* the computations of M that process the string *1211*, *222122*, 212121, and *22211*.
   c. Which of the strings in part (b) are *accepted* by M_1?

2. (10 points) Consider the FA M_2 given below:



   a. *Explain*, i.e., describe, what is the language recognized by M_2
   b. Which of the strings *baba*, *baab*, *abaaab*, *ε* are accepted by M_2?

3. (15 points) Build a *deterministic FA* for the following language L={*x* over {*a, b*}| *x* contains **both** substrings *aa* and *bb*}

4. (15 points) Build a *deterministic FA* that accepts the set of strings of odd length over {*a, b*} that **do not** contain the substring *bb*.

5. (15 points) Build a *deterministic FA* for the following language L={*x* over {*a, b*}| *x* contains **an odd number** of *a* symbols, or **exactly two** *b* symbols}

(Hint: in constructing each deterministic FA for problems 3, 4, and 5 make sure to consider *all the possibilities*, i.e., the different types of strings in the language of the corresponding FA.)