Due by 1559 AST Friday, March 25, 2011 — **Show your work**
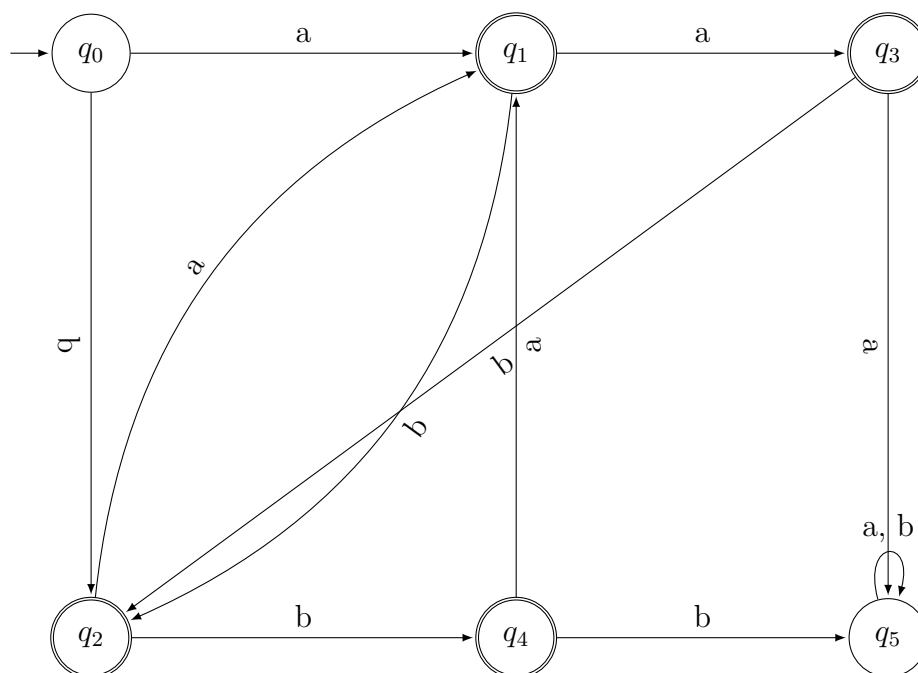
CSCI/MATH 2113 Final Exam: Tuesday 12 April 2011 — 14:00 — Dalplex

1. The automaton A is given by $(\{a, b\}, \{s_0, s_1, s_2\}, s_0, \{s_1, s_2\}, N)$, where N is given by the following table:

 | N | a | b |
   |-----|-----|-----|
   | s_0 | s_1 | s_0 |
   | s_1 | s_1 | s_2 |
   | s_2 | s_1 | s_0 |

   Draw a picture representing A.

2. The automaton A is represented by the following picture. Give the formal representation of A.

3. For the automaton given in Question 2, describe the language defined by A using English and using a regular expression.

4. Prove or disprove: the language $\{a^n b^m a^n | n \geq 0, m > 0\}$ is regular.

5. Draw an automaton that accepts an input of a's and b's if and only if it contains consecutive a's and consecutive b's.

6. Let A be the language defined by the regular expression $(a(bb|aa)^*)|(b(aa|bb)^*)$. Draw an automaton that accepts A^C.

7. Use the method of k-equivalence to reduce the given automaton.
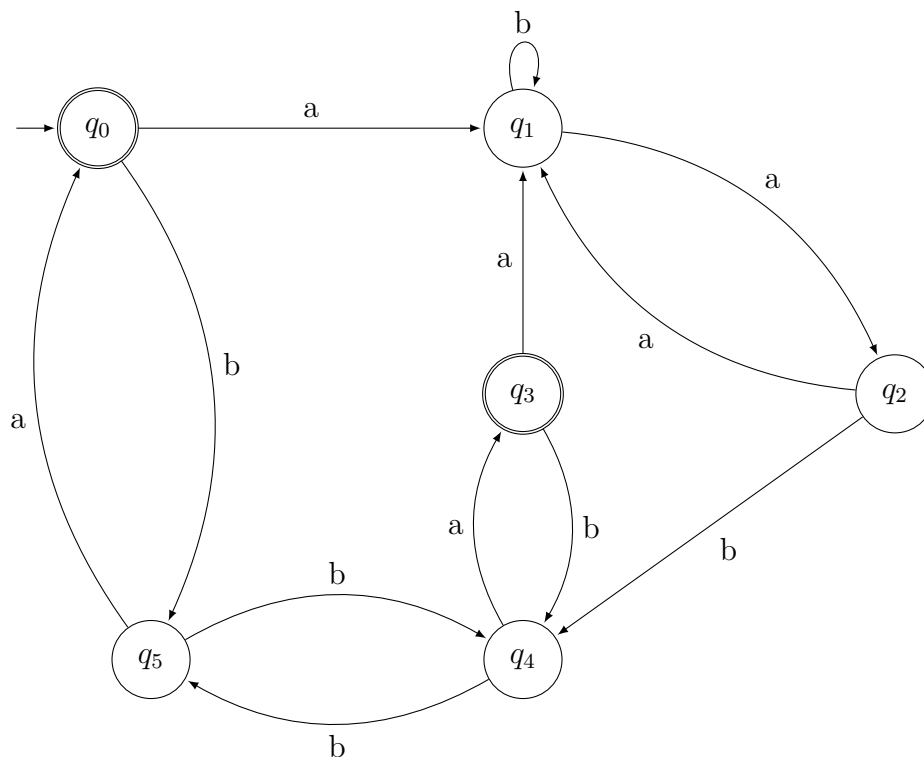
8. Use the method of k-equivalence to reduce the given automaton.
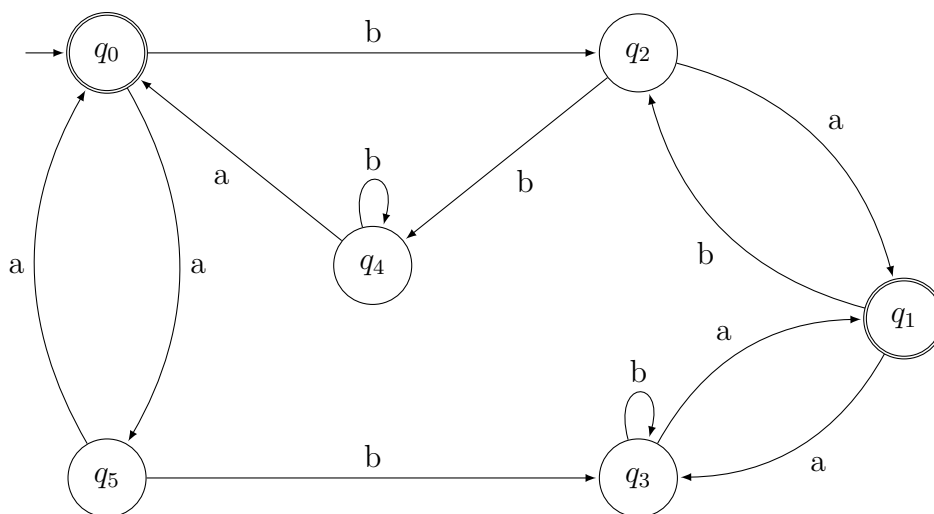
9. Are the automata from the previous two questions equivalent? Explain why or why not.