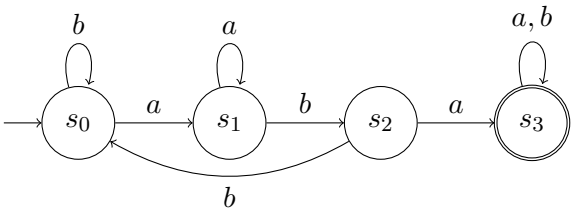
Discrete Mathematics
Peergrade assignment 6

1. Consider the finite state automaton A with input alphabet $\{a, b\}$ given by the following transition diagram:



   (a) Is the empty string accepted by this automaton?

   (b) Find three strings over the alphabet $\{a, b\}$ that are *not* accepted by this automaton.

   (c) Find three strings that are accepted by this automaton.

   (d) What is the language recognized by A? Describe it using either set-builder notation or a regular expression.

2. For each of the following languages, construct a finite state automaton which recognizes the same language.

   (a) $L = \{w | w \in \{0, 1\}^*, 3 \mid |w|_1\}$ where $|w|_1$ is the number of times symbol 1 appears in string w

   (b) $L(0(10|01)^*)$

3. For each of (a) – (c), either draw an example of a graph with the given specification, or a formal argument why no such graph exists.

   (a) A simple connected graph with 7 vertices and 7 edges

   (b) A connected graph with 6 vertices, 5 edges and that has a circuit.

   (c) A binary tree of height 3 with 10 leaves