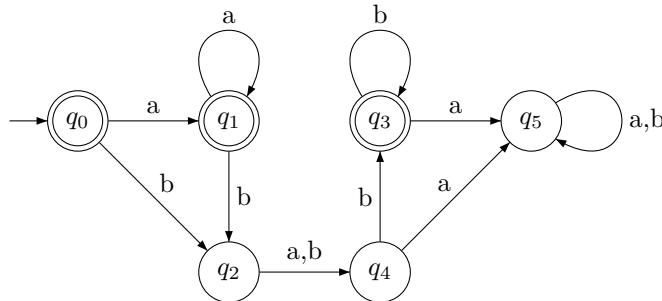


B501 Assignment 3

Due Date: Wednesday, February 29, 2012

Due Time: 11:00pm

- (10 points) Prove that the following languages are not regular. You may use the pumping lemma and the closure of the class of regular languages under union, intersection, and complement.
 - $\{0^n 1^m 0^n \mid m, n \geq 0\}$
 - $\{wtw \mid w, t \in \{0, 1\}^+\}$
- (10 points) Let $B = \{1^k y \mid y \in \{0, 1\}^* \text{ and } y \text{ contains at least } k \text{ 1s, for } k > 1\}$. Show that B is a regular language.
- (15 points) The pumping lemma says that every regular language has a pumping length p , such that every string in the language can be pumped if it has length p or more. If p is a pumping length for language A , so is any length $p' \geq p$. The *minimum pumping length* for A is the smallest p that is a pumping length for A . For example, if $A = 01^*$, the minimum pumping length is 2. The reason is that the string $s = 0$ is in A and has length 1 yet s cannot be pumped, but any string in A of length 2 or more contains a 1 and hence can be pumped by dividing it so that $x = 0$, $y = 1$, and z is the rest. For each of the following languages, give the minimum pumping length and justify your answer.
 - 0001*
 - $001 \cup 0^*1^*$
 - $1^*01^*01^*$
- (10 points) Let A be an infinite regular language. Prove that A can be split into two infinite disjoint regular subsets.
- Minimize the following DFA's
 - (10 points)



(b) (10 points)

