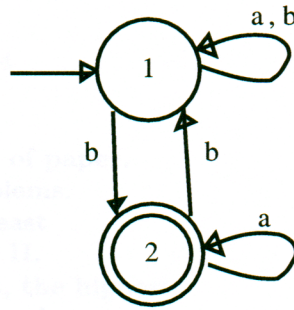


## Part II: Graduate Questions

1. Consider the state diagram for the NFA:



- (a) Convert this NFA to a DFA that recognizes the same language.  
(b) Convert the resulting DFA to an equivalent regular expression.
2. Show that the class of regular languages is closed under the star operator.
3. Use the pumping lemma to show that the following language is not regular:

$$L = \{1^{n^2} \mid n \geq 0\}$$

(In other words, L contains all strings of 1's whose length is a perfect square.)