Exercise 3. Due by class time Thursday October 17.

1. Recall that the $\varepsilon$-closure of a state is every state reachable from that state on $\varepsilon$-transitions alone. Compute the $\varepsilon$-closure of each of the states in the $\varepsilon$-NFA below.

2. If we convert the $\varepsilon$-NFA shown to the right to a DFA using the construction of Theorem 1.39, what is the upper bound on the number of states in the constructed DFA? In general, if the NFA has $n$ states how many states does the constructed DFA have in the worst case?

3. Guess a regular expression equivalent to the $\varepsilon$-NFA to the right. Explain your reasoning.

4. Given the $\varepsilon$-NFA to the right, give an equivalent NFA with no epsilon transitions. (This is not exactly following an algorithm from text or lecture, but it uses elements of the NFA to DFA construction and problem 1 of this exercise.)