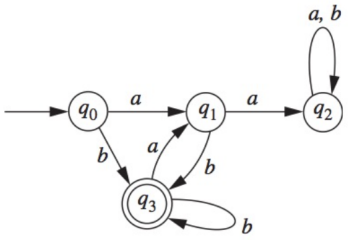
Consider the state diagram of the following DFA



1: State Diagrams

(a) What is the start state?

(b) What is the set of accepting states

(c) List the sequence of states that the machine goes through on input *abab*

(d) Does the machine accept *abab*

(e) Does the machine accept ϵ

2: Formal Definitions

Give the formal definition of the DFA

3: Language of a DFA

(a) List 2 strings the DFA accepts

(b) List 2 strings the DFA rejects

(c) What is the language of this DFA (the set of accepted strings)?

4: Design DFAs

Design a DFA for each of the following languages. The alphabet is $\{x, y\}$

- $L_1 = \{w \mid w \text{ has substring } xyyx\}$
- $L_2 = \{w \mid w \text{ doest not have substring } xyyx\}$
  (Hint: Do not start this DFA from scratch, how can you modify the previous DFA).
- $L_3 = \{w \mid w \text{ has exactly 2 } y's\}$
- $L_4 = \{w \mid w \text{ has at least 2 } y's\}$