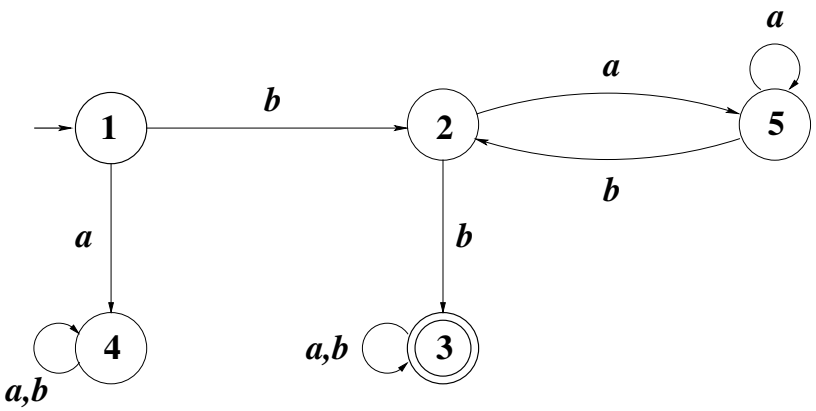
1. Construct a deterministic finite automaton (DFA) that recognizes the following language:

$$\left\{ w \in \{a,b\}^* \mid w \text{ starts with } b \text{ and contains } bb \text{ as a substring.} \right\}$$

The alphabet is $\{a,b\}$.

Note: bb is in the language and so should be accepted by the DFA.



2. Consider the language

$$a^*b \cup b^*$$

(i.e., $\{a\}^*\{b\} \cup \{b\}^*$).

The alphabet is $\{a,b\}$.

(a) Construct a deterministic finite automaton (DFA) recognizing this language.

Done in class.

(b) Show that **any** DFA that accepts this language has to contain a **dead state.**

Hint: Find a string w such that *any* string that has w as a prefix will not be in the language. It is not enough to exhibit one DFA for this language that has a dead state.

Done in class: any string that has ba as a prefix is not in the language.