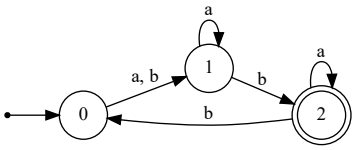
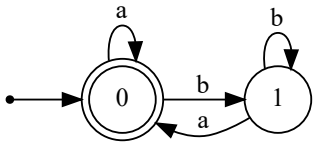
COMPSCI 3331 - Fall 2022 - Quiz 4

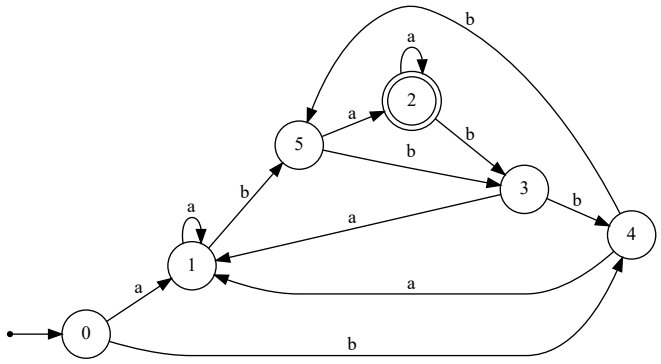
Name									
Student Number									

1. (2 marks) Given the two DFAs below, construct a **DFA** that accepts the intersection of the languages accepted by the DFAs.





Solution:



Note that in this solution (3-state automaton is the first component, 2-state automaton is the second component), then the states correspond to: $0 = (0,0), 1 = (1,0), 2 = (2,0), 3 = (0,1), 4 = (1,1)$, *and* $5 = (2,1)$.

2. (2 marks) Show that the grammar $G = (V, \Sigma, P, S)$, where $V = \{S, A\}$, $\Sigma = \{a, b, c\}$ and P is given below, generates the words *acbbca* and *aaccaca*.

$$
\begin{array}{lcl}
S & \rightarrow & aSAa \\
S & \rightarrow & c \\
A & \rightarrow & bA \\
A & \rightarrow & c
\end{array}
\qquad
\begin{array}{lcl}
S & \Rightarrow & aSAa \Rightarrow acAa \Rightarrow acbAa \Rightarrow acbbAa \Rightarrow acbbca \\
S & \Rightarrow & aSAa \Rightarrow aaSAaAa \Rightarrow aacAaAa \Rightarrow aaccaAa \Rightarrow aaccaca
\end{array}
$$