1. (a) Make the complete state diagram for the synchronous circuit below. Label the states (“bubbles”) with the values of $Q_AQ_BQ_C$. Label the transitions with the output value $Y = Q_AQ_BQ_C$ (e.g., $/0$ or $/1$).

(b) If the circuit is started in the state 111, it follows a recurring sequence of states.
   i. How many states are there in this sequence?
   ii. If the circuit is started in one of the states not in the recurring sequence referred to above, does it eventually enter the sequence?

2. A synchronous sequential circuit must be designed to follow the state diagram shown below. It has one input (C). It is to be constructed from two JK flip-flops plus additional logic gates as necessary.

   (a) Do the necessary analysis and construct Karnaugh maps to find the logical functions for $J_A$, $K_A$, $J_B$, and $K_B$ in simplified sum-of-products form.

   (b) Draw the resulting diagram for the circuit.