Supplementary Homework #5 Problems

Please show your work where appropriate.

1. Suppose a certain sequential circuit has a $JK$ flip-flop labeled $A$ and a $D$ flip-flop labeled $B$. In addition, the circuit has an input $x$ and an output $y$. The formulas for the flip-flop inputs and $y$ are given below.

$$J_A = x'$$
$$K_A = B_0$$
$$D_B = A_0 + B_0'$$
$$y = xA_0B_0$$

(a) Draw the circuit.
(b) Write the next state equation for the $A$ flip-flop.
(c) Write the next state equation for the $B$ flip-flop.
(d) Write down the state table of the circuit.
(e) Write down the state diagram of the circuit.

2. For the circuit in Figure 1, write down the next state equation for the $A$ flip-flop.

3. For the circuit in Figure 2, do the following:

(a) Write the next state equation for the $A$ flip-flop.
(b) Write the next state equation for the $B$ flip-flop.
(c) Write down the output equation for $y$.
(d) Write down the state table of the circuit.
(e) Write down the state diagram of the circuit.

4. For the circuit in Figure 3, do the following:

(a) Write the next state equation for the $A$ flip-flop.
(b) Write the next state equation for the $B$ flip-flop.
(c) Write down the output equation for $y$.
(d) Write down the state table of the circuit.
(e) Write down the state diagram of the circuit.
Figure 1

![Diagram showing a circuit with inputs X, B, Y, and C, and outputs A and \( \bar{A} \).]
Figure 2

X

\[ \overline{A} \]

\[ B \]

\[ \overline{B} \]

\[ \text{Clock} \]

\[ \text{Y} \]
Figure 3