1. Problem 5.1

2. Problem 5.4

3. A sequential circuit with two $D$ flip-flops $A$ and $B$, two inputs $x$ and $y$, and one output $z$ is specified by the following next-state and output equations:

\[
A(t + 1) = xy' + xB \\
B(t + 1) = y'A + xB \\
z = A
\]

(a) Draw the logic diagram of the circuit.
(b) List the state table for the circuit.
(c) Draw the corresponding state diagram.

4. A sequential circuit has one flip-flop $Q$, two inputs $x$ and $y$, and one output $C$. It consists of a full adder circuit connected to a $D$ flip-flop, as shown below.

(a) Derive the state table of the sequential circuit.
(b) Derive the state diagram of the sequential circuit.
(c) Write a Verilog module to implement the circuit.
5. Derive the state table and state diagram of the sequential circuit shown below. Explain the function that the circuit performs.