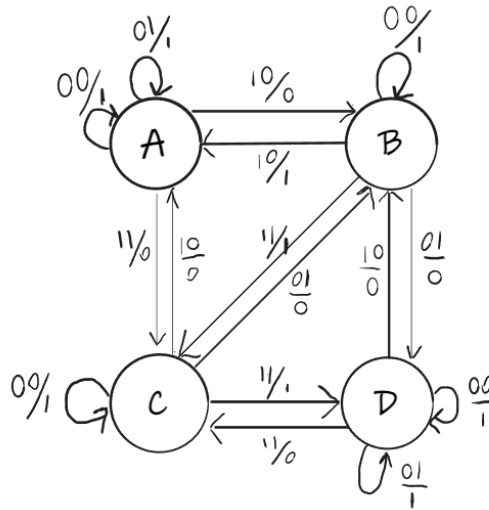


Basic Design Steps, State-Assignment
 Problems, Moore & Mealy Machines
 Assigned Date: Eleventh Week
 Finish by Nov. 16, 2022

P1 (20 points): Design and implement a Moore machine that detects the pattern 101 in its 1-bit serial input stream. Explain the logic behind your solution. Show your work for all steps discussed during the lectures: graph, state table, state-assigned table, truth tables, k-maps, expressions, circuit diagram.

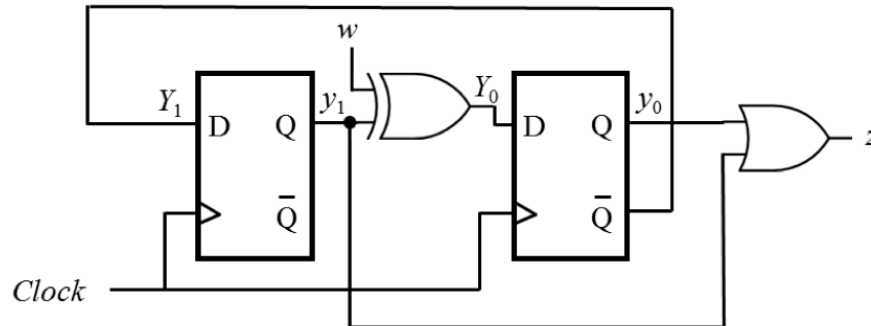
P2 (15 points): The FSM state diagram below has two inputs x_1 and x_0 . In addition, it has two DFFs, three 4-to-1 MUXes, a single XOR gate, a single AND gate, and a single output bit Z. Answer the following questions about this FSM.



- Is this a Moore FSM or Mealy FSM?
- The state encodings are A=00, B=01, C=10, and D=11. Write a state-assigned table for this state diagram.
- Use K-maps to determine the expressions for the next-state variables.

Basic Design Steps, State-Assignment
Problems, Moore & Mealy Machines
Assigned Date: Eleventh Week
Finish by Nov. 16, 2022

P3 (15 points): An FSM has two D flip-flops, an input w , and an output z . The circuit diagram is shown below.



- Find the logic expressions of Y_1 , Y_0 , and the output z
- Show the state-assigned table of the FSM.
- Draw the state diagram of the FSM.

P4 (20 points): Draw a state diagram for a state machine that reads in a sequence of bits, one bit at a time, and outputs a 0 whenever the sequence 1010 is detected. It outputs a 1 otherwise. The machine keeps detecting the sequence and never stops.

- Using a Moore machine
- Using a Mealy machine

P5 (15 points): Consider the following state table for a FSM:

Present State	Next State		Output z
	$w=0$	$w=1$	
A	A	B	0
B	B	C	1
C	C	D	0
D	D	A	1

- Draw the state diagram of the FSM
- Perform state minimization to minimize the number of states. Show your partitions in the procedure.
- Draw the new state diagram of the minimized FSM

Basic Design Steps, State-Assignment
Problems, Moore & Mealy Machines
Assigned Date: Eleventh Week
Finish by Nov. 16, 2022

P6 (15 points): Reduce the state diagram below to use only 5 states:

