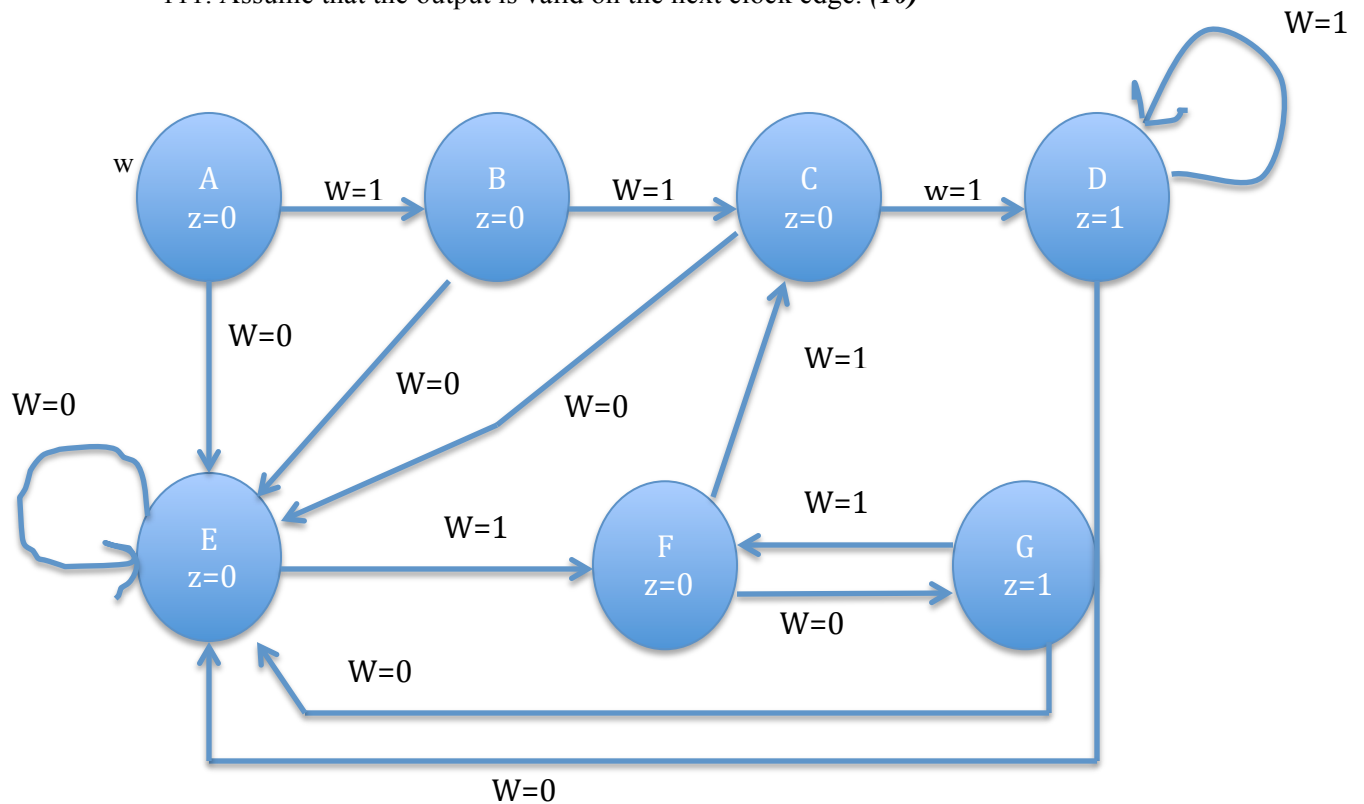


Additional Problems (Graded)

1. Complete the timing diagram for the circuit in Figure 1. **(6)**

	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14	t15	t16	t17	t18
clk																			
D																			
Qa																			
Qb																			
Qc																			

2. Draw the state diagram for a machine that can recognize the input sequences 010 and 111. Assume that the output is valid on the next clock edge. **(10)**



3. Provide the state assignment table for your diagram from (2). **(6)**

PS		NS		z
		w = 0	w = 1	
	y2 y1 y0	Y2 Y1 Y0	Y2 Y1 Y0	
A	000	100	001	0
B	001	100	010	0
C	010	100	011	0
D	011	100	011	1
E	100	100	101	0
F	101	110	010	0
G	110	100	101	1
H	111	ddd	ddd	d

4. Using the state table below, give the equation for z and Y_0 . Assume sequential encoding and DFFs. Show all of your work. **(10)**

$$\begin{aligned}
 Y_0 &= w'[y_1' y_0 + y_1 y_0] + w[y_1 y_0'] \\
 &= w'[y_0(y_1 + y_1')] + w y_1 y_0' \\
 &= w'[y_0(1)] + w y_1 y_0' \\
 &= w' y_0 + w y_1 y_0'
 \end{aligned}$$

$$\begin{aligned}
 z &= w'[y_1 y_0'] + w[y_1' y_0 + y_1 y_0' + y_1 y_0] \\
 &= w' y_1 y_0' + w[y_1' y_0 + y_1(y_0' + y_0)] \\
 &= w' y_1 y_0' + w[y_1' y_0 + y_1(1)] \\
 &= w' y_1 y_0' + w[y_1' y_0 + y_1] \\
 &= w' y_1 y_0' + w(y_1 + y_0)
 \end{aligned}$$