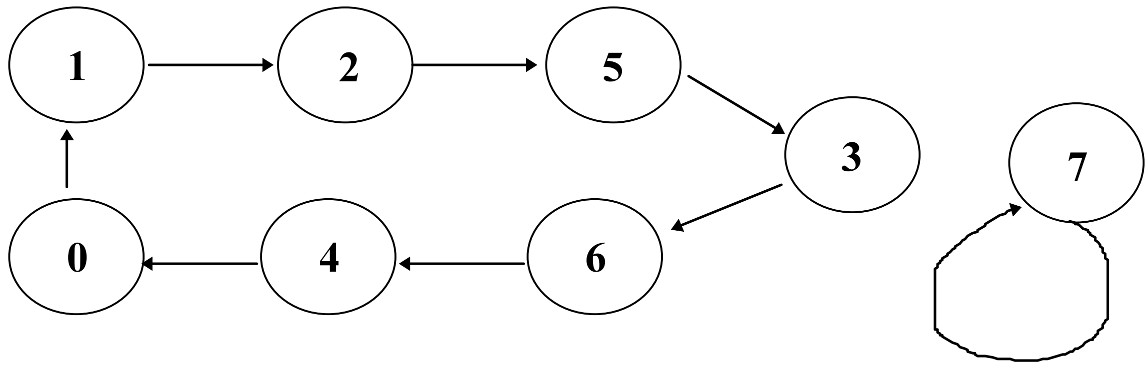
1.

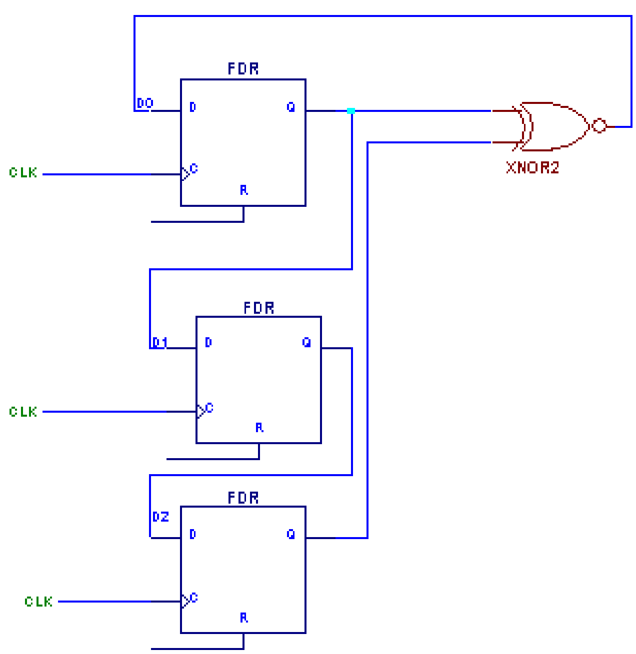


$Q_2Q_1Q_0$	$D_2D_1D_0$
0 0 0	0 0 1
0 0 1	0 1 0
0 1 0	1 0 1
1 0 1	0 1 1
0 1 1	1 1 0
1 1 0	1 0 0
1 0 0	0 0 0
1 1 1	1 1 1

Since the action for state 7 was not defined, you could either make it go to state 0 or make it a self-loop.

Formulas: $D_0=Q_0\oplus Q_2$; $D_1=Q_0$; $D_2=Q_1$

Schematic:



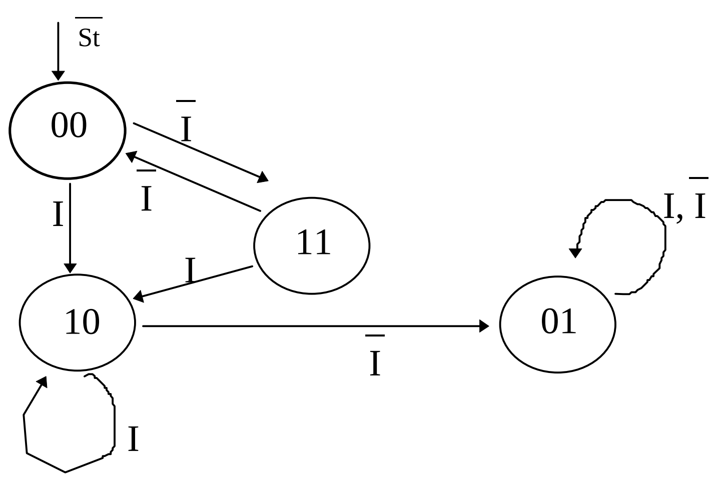
2. a) Three 3-input LUTs can be connected to make a 4-input LUT. Let the 4 input LUT be L(a,b,c,d). We will create two 3-input LUTS f(a,b,c) and g(a,b,c), where f(a,b,c) = L(a,b,c,0) and g(a,b,c) = L(a,b,c,1) So f will calculate the same thing as L, given that d is 0, and g will do the same thing given that d is 1. Finally we will hook both of these 3-input LUTs into the third 3-input LUT, which will also take d as an input. This LUT h(f,g,d) will return f if d=0 and g otherwise. Hence the function for it will be fd'+gd. As a result any 4 imput lookup can be done.

b) Given a 4-input LUT which we have created in part a, we can build a 5-input LUT by doing the same thing as in part a, the only difference being that f and g will now be 4 argument functions.

3.
State Table:

St	In	Q_1Q_0	D_1D_0
0	X	X X	0 0
1	0	0 0	1 1
1	1	0 0	1 0
1	X	0 1	0 1
1	0	1 0	0 1
1	1	1 0	1 0
1	0	1 1	0 0
1	1	1 1	1 0

State Diagram: Start assumed high unless noted otherwise.



4.