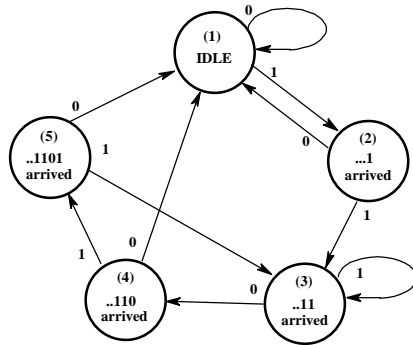


DOC Course 112: Hardware: Tutorial 6 Solution
Problem 1



Problem 2

Input	State	State Type	Q3	Q2	Q1	State	D3	D2	D1
0	1	Idle	0	0	1	1	0	0	1
0	2	.. 1	0	1	0	1	0	0	1
0	3	.. 11	0	1	1	4	1	0	0
0	4	.. 110	1	0	0	1	0	0	1
0	5	.. 1101	1	0	1	1	0	0	1
0	6		1	1	0	X	X	X	X
0	7		1	1	1	X	X	X	X
0	8		0	0	0	X	X	X	X
1	1	Idle	0	0	1	2	0	1	0
1	2	.. 1	0	1	0	3	0	1	1
1	3	.. 11	0	1	1	3	0	1	1
1	4	.. 110	1	0	0	5	1	0	1
1	5	.. 1101	1	0	1	3	0	1	1
1	6		1	1	0	X	X	X	X
1	7		1	1	1	X	X	X	X
1	8		0	0	0	X	X	X	X

		Q2 Q1			
		00	01	11	10
IQ3	00	X	1		1
	01	1	1	X	X
	11	1	1	X	X
	10	X		1	1

		Q2 Q1			
		00	01	11	10
IQ3	00	X			
	01			X	X
	11		1	X	X
	10	X	1	1	1

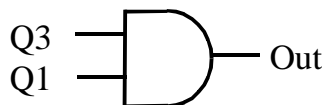
		Q2 Q1			
		00	01	11	10
IQ3	00	X		1	
	01			X	X
	11	1		X	X
	10	X			

$$D3 = I \cdot Q2' \cdot Q1' + I' \cdot Q2 \cdot Q1$$

$$D2 = I \cdot Q3' + I' \cdot Q1$$

$$D1 = Q3 + I' \cdot Q2' + I \cdot Q2 + Q2 \cdot Q3'$$

Problem 3



Problem 4

Input	State	Q3	Q2	Q1	Next State	D3	D2	D1
0	6	1	1	0	1	0	0	1
0	7	1	1	1	5	1	0	1
0	8	0	0	0	1	0	0	1
1	6	1	1	0	1	0	0	1
1	7	1	1	1	3	0	1	1
1	8	0	0	0	6	1	1	0

The circuit is safe and will not get stuck in states 6,7 or 8