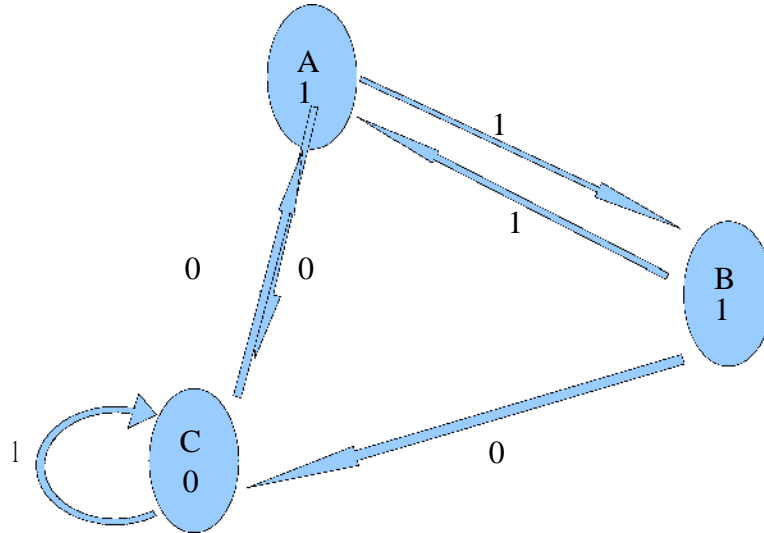


# Homework 23 Solutions

## Chapter 7, 2a (i)

### State Equations and Output Equation

$$D_A = Q_C X' + Q_B X$$



$$D_B = Q_A X$$

$$D_C = Q_A X' + Q_B X' \square Q_C X$$

$$Z = Q_A + Q_B$$

# Homework 23 Solutions

12. The state table for this counter follows

q	q *	
	x = 0	x = 1
0	1	3
1	2	3
2	3	3
3	4	4
4	0	5
5	3	6
6	3	7
7	3	2

This produces the following maps

		x A			
		00	01	11	10
B C	00			1	
	01			1	
	11	1			1
	10			1	

A\*

		x A			
		00	01	11	10
B C	00				1
	01	1	1	1	1
	11		1	1	
	10	1	1	1	1

B\*

		x A			
		00	01	11	10
B C	00	1		1	1
	01		1		1
	11		1		
	10	1	1	1	1

C\*

a. i. For the D flip flop, we have

$$D_A = A'BC + xAB' + \underline{xAC'}$$

$$D_B = B'C + BC' + \underline{xA'B'} + \{AB \text{ or } AC\}$$

$$D_C = x'AC + \underline{xA'B'} + \underline{xAC'} + BC' + A'C'$$

## Homework 23 Solutions

d. All of the outputs come from flip flops. We can compute the inputs for a D flip flop for Q using

$$D = Q^* = JQ' + KQ$$

and then simplifying the algebra. The result is

$$D = A Q + B' Q + C' Q + x A' B' + x' A B + x' A C$$

we already found the D inputs for the other flip flops in part a.

