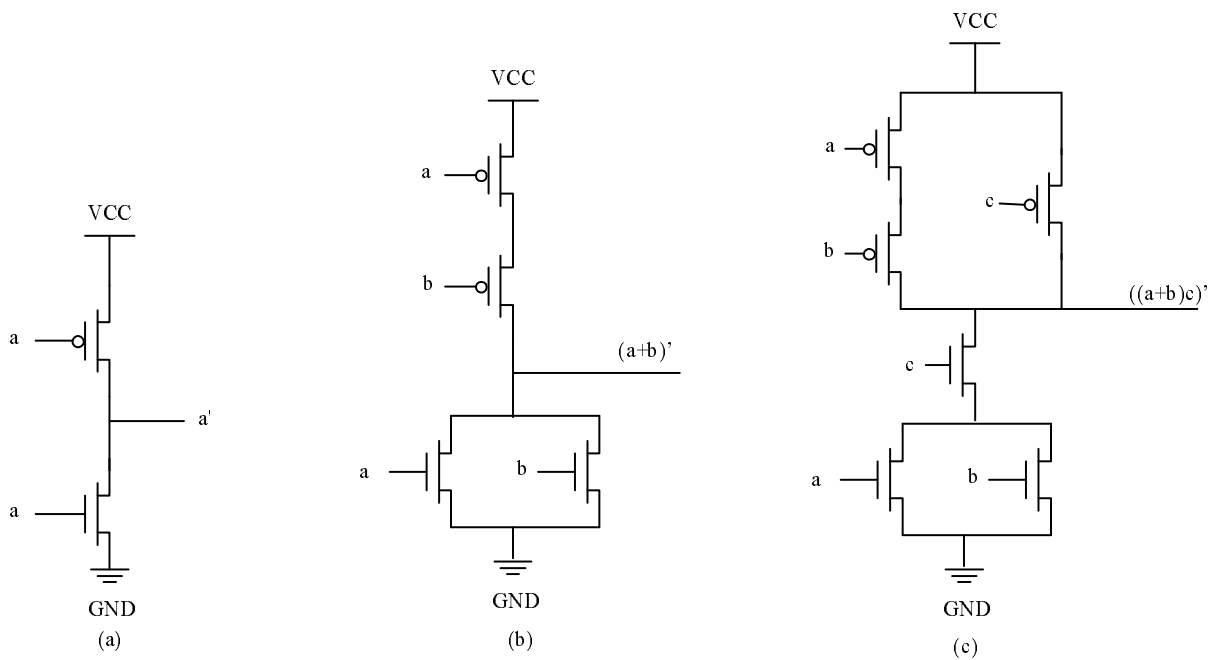
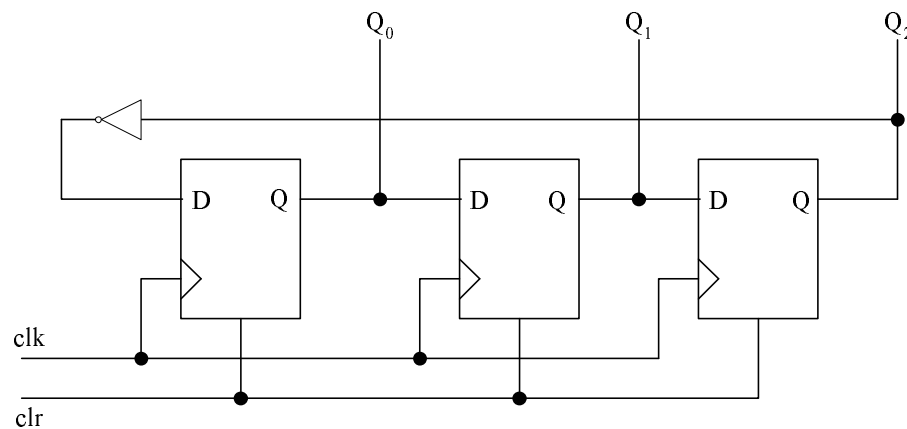


## CSE140L Exercises Solutions

1.



2. The 3-bit Johnson counter is shown in the following figure.



a) The possible states are: (0,0,0), (0,0,1), (0,1,1), (1,1,1), (1,1,0), (1,0,0)

b) The possible states, with initial state (0,1,0) are: (0,1,0), (1,0,1)

3. A and B both have incoming edges with different output values, so A is split into A0 and A1, and B is split into B0 and B1.

PS	x=a	x = b	Output
A0	A1	B0	0
A1	A1	B0	1
B0	C	D	0
B1	C	D	1
C	A0	E	1
D	B0	E	1
E	B1	D	0

4.

a) The truth table is as follows:

Inst(7)	Inst(6)	R1.en	R2.en	R1_sel
0	0	1	0	0
0	1	0	1	x
1	0	1	0	1
1	1	1	0	1

b)

**move1 a5a4a3a2a1a0** – move data into R1  
move2 001111 – move masking data into R2  
shift 000100 – left rotate R1 by 4  
mask 000000 – mask R1 and R2