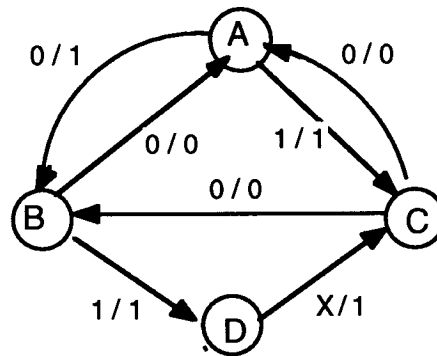


1. For the following state table,

q	q *		z	
	x = 0	x = 1	x = 0	x = 1
A	B	C	1	1
B	A	D	0	1
C	B	A	0	0
D	C	C	1	1

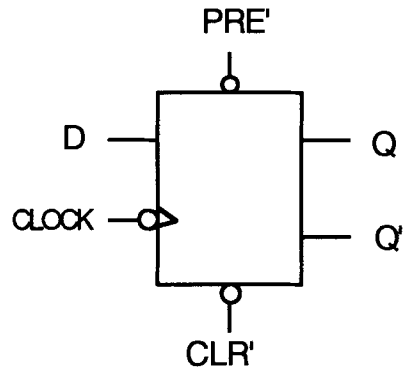
a) Draw a state diagram.



b) Complete the following timing trace as far as you can, even after you no longer know the input.

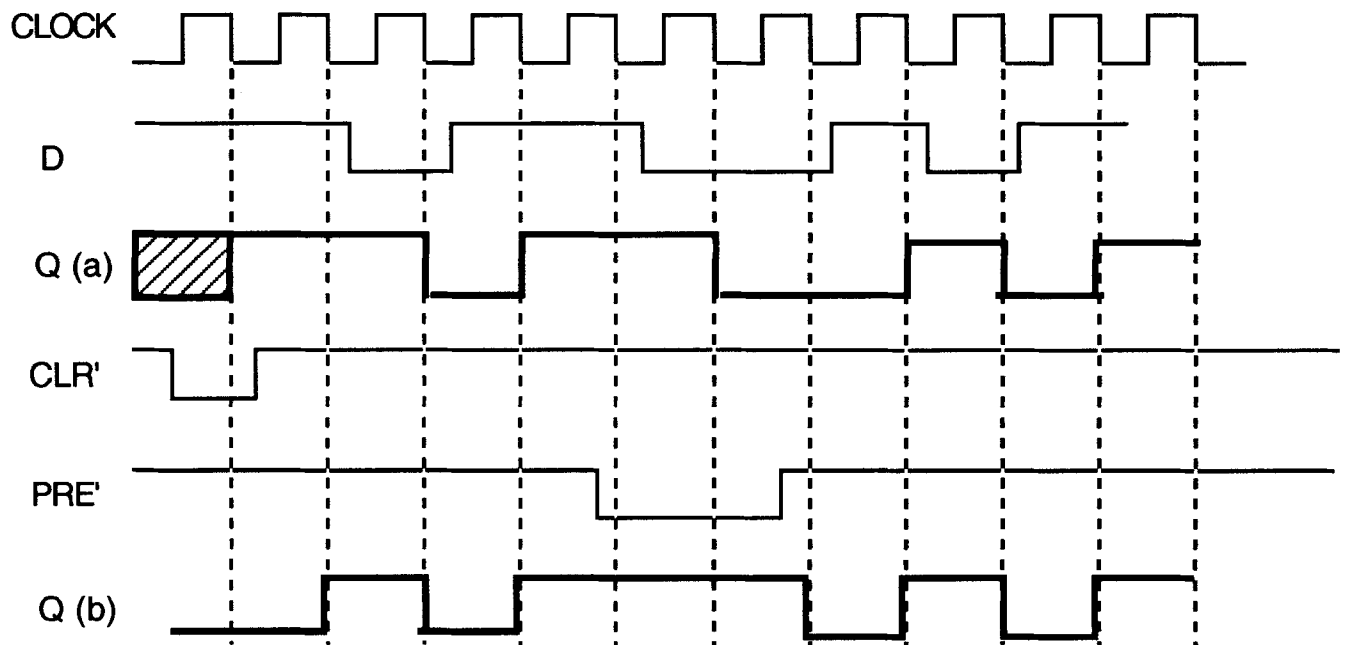
x	0	0	1	0	1		
q	A	B	A	C	B	D	C
z	1	0	1	0	1	1	0

2. For the trailing-edge triggered D flip flop shown, complete the timing diagram (showing Q for as far as you can).

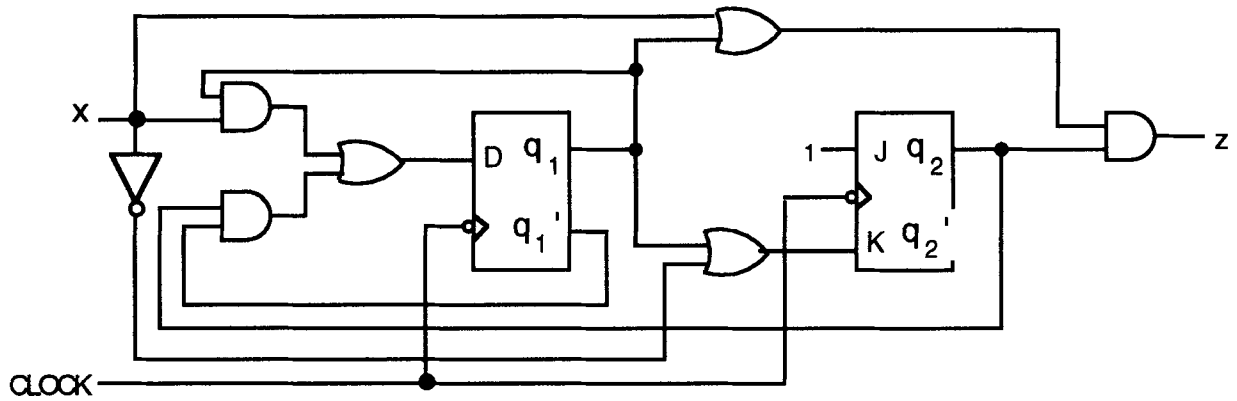


a) If there is no CLR' or PRE'.

b) With the values of CLR' and PRE' shown (same D as in part a)



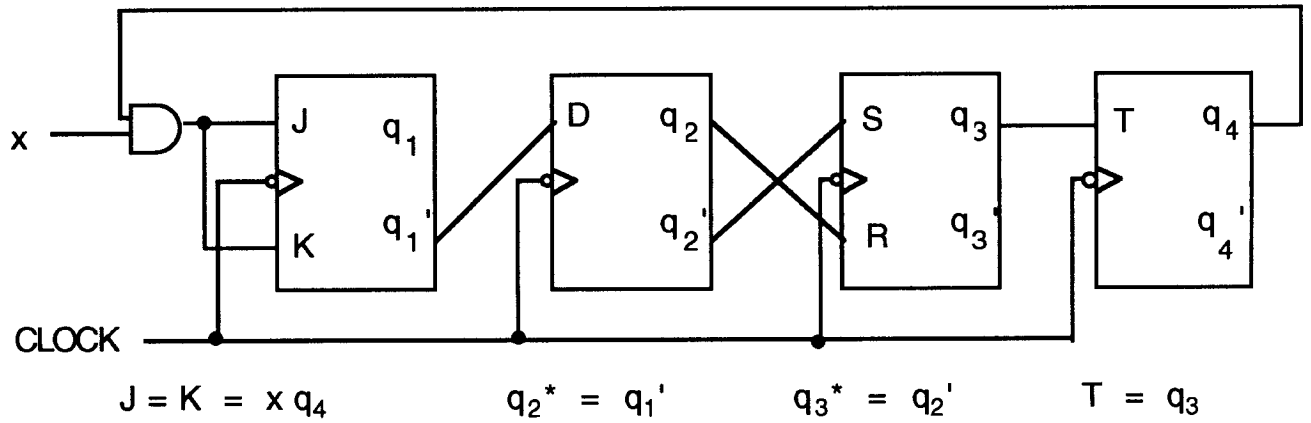
3. For the circuit shown (with trailing-edge triggered flip flops), complete the state table.



$$D = x q_1 + q_1' q_2 \quad J = 1 \quad K = x' + q_1 \quad z = q_2 (x + q_1)$$

$q_1 q_2$	$q_1^* q_2^*$		$z$	
	$x = 0$	$x = 1$	$x = 0$	$x = 1$
0 0	0 1	0 1	0	0
0 1	1 0	1 1	0	0
1 0	0 1	1 1	0	1
1 1	0 0	1 0	1	1

4. For the following circuit, complete the timing trace as far as you can, even after the input is no longer known.



x	0	0	1	1	0	1							
q <sub>1</sub>	0	0	0	1	0	0	1	1	1	1			
q <sub>2</sub>	0	1	1	1	0	1	1	0	0	0	0		
q <sub>3</sub>	0	1	0	0	0	1	0	0	1	1	1	1	
q <sub>4</sub>	0	0	1	1	1	1	0	0	0	1	0	1	0