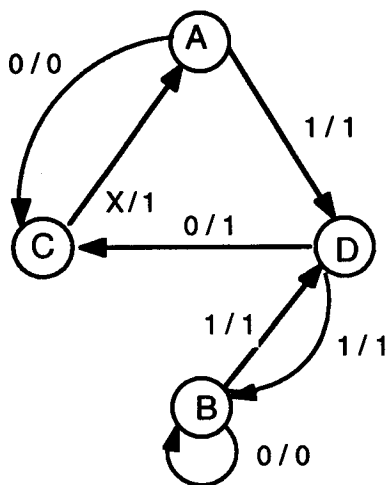


1. For the following state table,

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

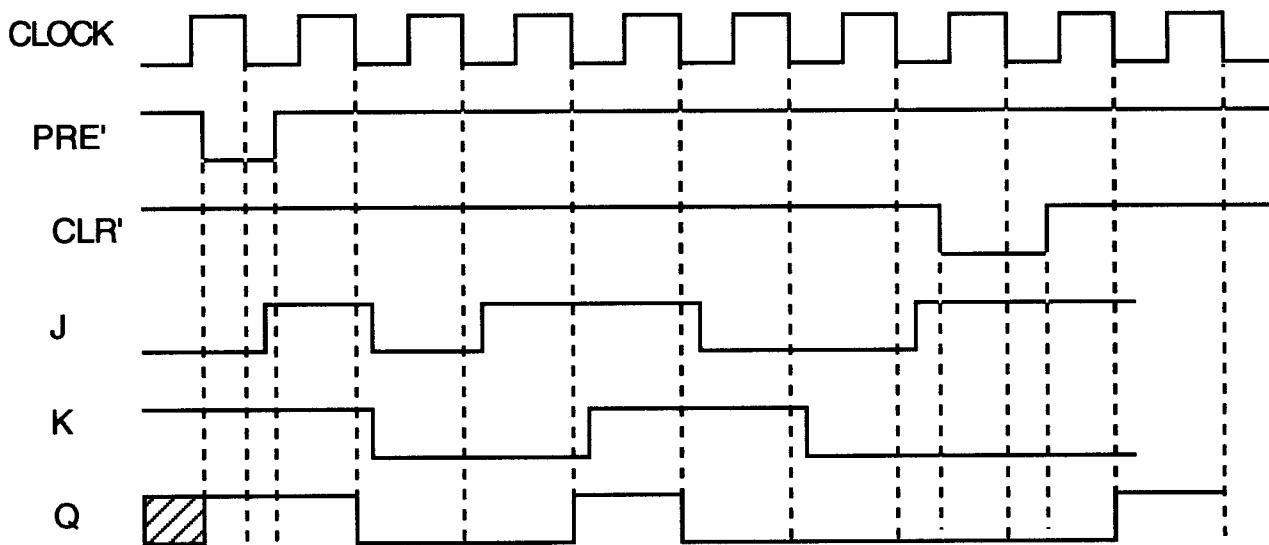
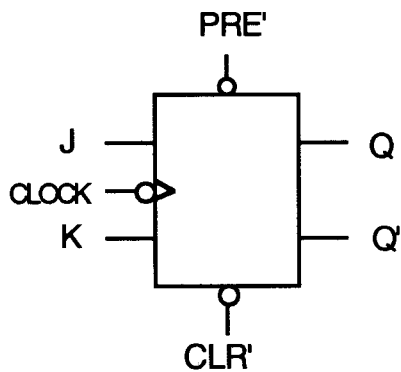
a) Draw a state diagram.



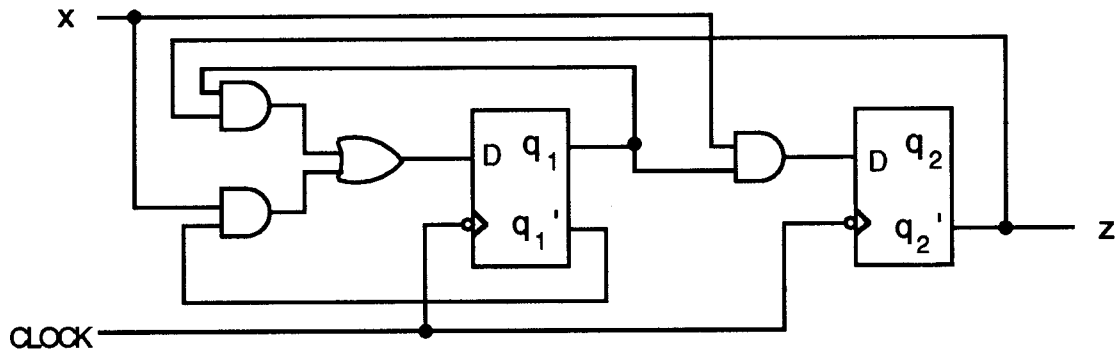
b) Complete the following timing trace as far as you can, even after you no longer know the input.

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

2. For the JK flip flop shown, complete the timing diagram (showing Q for as far as you can).



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



$$D_1 = q_1 q_2' + x q_1'$$

$$D_2 = x q_1$$

$$z = q_2'$$

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

4. For the following state table, compute the flip flop inputs and the system output, z, assuming q_1 is a D flip flop and flip flop 2 is a JK flip flop. You just need to show the logic equations.

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

$q_1 q_2 \backslash x$	0	1
00	1	
01		1
11	X	X
10		

q_1^*

$q_1 q_2 \backslash x$	0	1
00		1
01	1	
11	X	X
10	X	1

q_2^*

$$D_1 = x' q_1' q_2' + x q_2$$

$$J_2 = x$$

$$K_2 = x$$