Marcus Domingo
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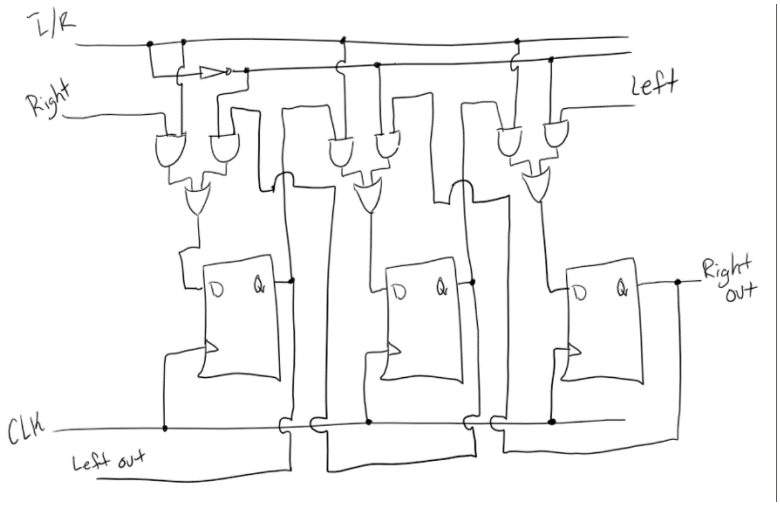
7.13:



7.18: The count starts out at 000, then input into T0 is a 1 so the count is 001. Then output of 1 goes to T1, while input of 1 goes into T0 so the count is then 010. Then the output of 1 goes to T2, while output of 0 goes to T1, while input of 1 goes to T0 so the count is 111. Then back to 000. Therefore, the counting sequence for the counter is 000, 001, 010, 111.

7.37: $t_{su} = 0.6\ ns, t_h = 0.4\ ns, 0.8\ ns \leq t_{cQ} \leq 1.0\ ns$

$$T_{min} = t_{cQ} + 3(t_{AND}) + t_{XOR} + t_{MUX} + t_{su} = 1.0 + 3(1.2) + 1.2 + 7.0 + 0.6 = 13.4ns$$

$$F_{max} = \frac{1}{T_{min}} = \frac{1}{13.4ns} = 74.63\ MHz$$

7.38: $T_{min} = t_{cQ} + k(t_{REG}) + t_{MUX} + t_{su}$

$$F_{max} = \frac{1}{T_{min}} = \frac{1}{t_{cQ} + k(t_{REG}) + t_{MUX} + t_{su}}$$

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8.29:

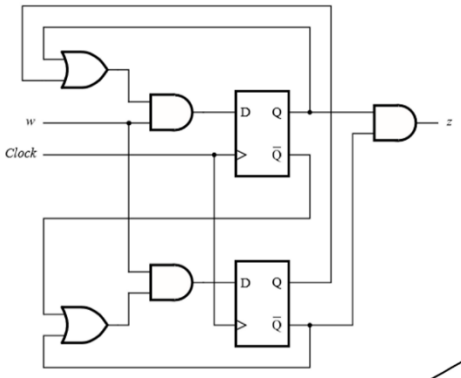
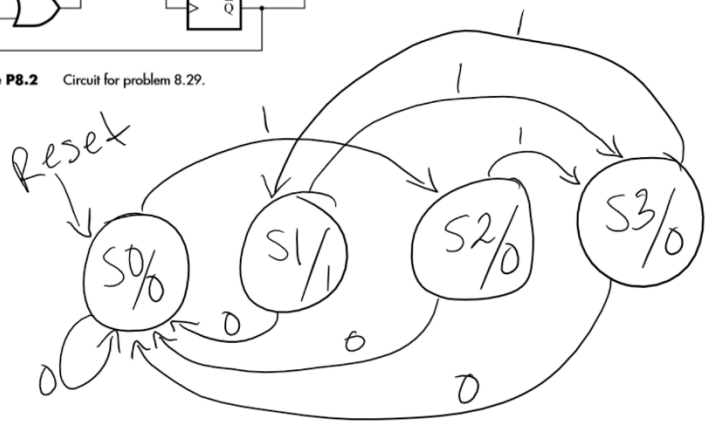


Figure P8.2 Circuit for problem 8.29.



Present State	Next State		Output
	w = 0	**w = 1**	***z***
S0	S0	S2	0
S1	S0	S3	1
S2	S0	S3	0
S3	S0	S1	0

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6.

$Q^+ = JQ' + K'Q$

$J = \overline{(X'B)(XB')} = \overline{(X+B')(X'+B)} = X'B + XB'$

$K = \overline{X'B} = X'B$

$A^+ = (X'B + XB')A' + X'BA = X'BA' + XB'A' + X'BA = X'B + XB'A'$

$J = K = \overline{X' + A'} = XA$

$B^+ = XAB' + XAB = XA$

First JK flip-flop:

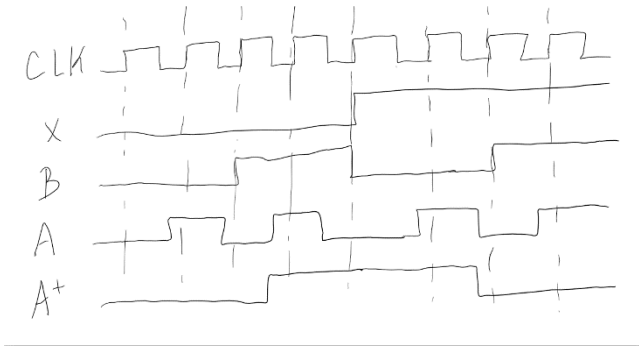
Inputs		Current State	Next State
X	**B**	**A**	**A***
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

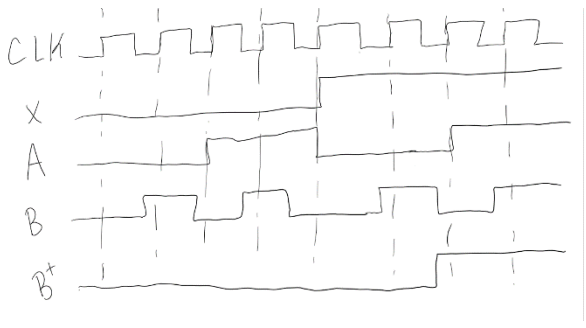
Second JK flip-flop:

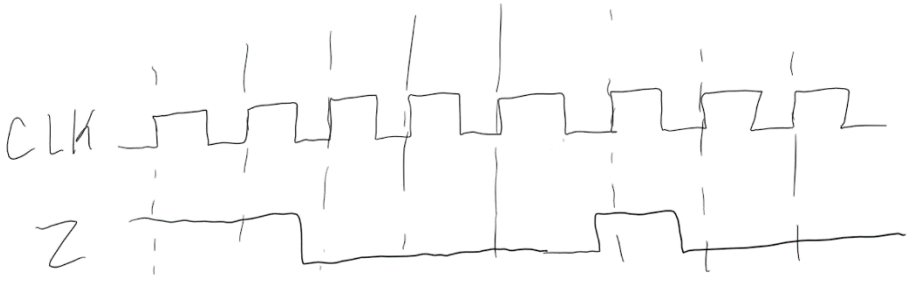
Inputs		Current State	Next State
X	**A**	**B**	**B***
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

Output
Z
1
1
0
0
0
1
0
0

The circuit is a Moore machine because the output depends on the current state only.







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7.

$J_1 = XQ_2'$ $K_1 = X$ $J_2 = XQ_1$ $K_2 = X$

$Q_1^+ = XQ_2'Q_1' + XQ_1$ $Q_2^+ = XQ_1Q_2' + XQ_2$

First JK flip-flop:

Inputs		Current State	Next State
X	Q2	Q1	Q1*
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

Second JK flip-flop:

Inputs		Current State	Next State
X	Q1	Q2	Q2*
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Output
Z
0
0
0
0
1
0
0
0

This circuit is a Mealy machine because the output depends on the current state and input.