Homework 16 Solutions

1.

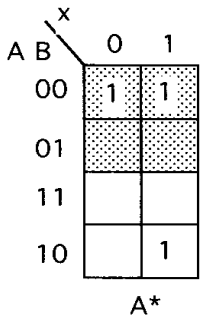
b)

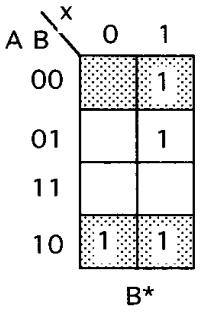
x	A	B	A*	B*	z	S_A	R_A	S_B	R_B	T_A	T_B
0	0	0	1	0	0	1	0	0	X	1	0
0	0	1	0	0	0	0	X	0	1	0	1
0	1	0	0	1	1	0	1	1	0	1	1
0	1	1	0	0	1	0	1	0	1	1	1
1	0	0	1	1	0	1	0	1	0	1	1
1	0	1	0	1	0	0	X	X	0	0	0
1	1	0	1	1	0	X	0	1	0	0	1
1	1	1	0	0	1	0	1	0	1	1	1

The output is

$$z = x' A + A B$$

To obtain the D and J K inputs, we map A* and B* (using the quick method for the JK flip flops).





$D_A = A' B' + x B'$ $\quad J_A = B'$ $\quad K_A = x' + B$

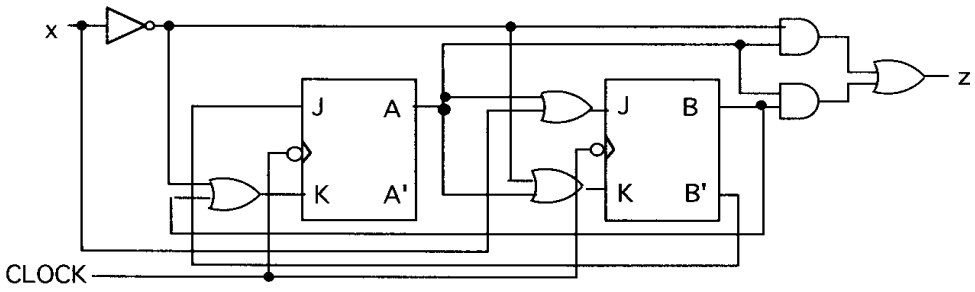
$D_B = x A' + A B'$ $\quad J_B = x + A$ $\quad K_B = x' + A$

The SR and T inputs can be obtained from maps of the truth table above.

$S_A = A' B'$ $\quad R_A = x' A + B$ $\quad S_B = x A' + A B'$ $\quad R_B = A B + \{x' B \text{ or } x' A'\}$

$T_A = A' B' + A B + \{x' A \text{ or } x' B'\}$ $\quad T_B = A + x' B + x B'$

The circuit for the JK design is



Homework 16 Solutions

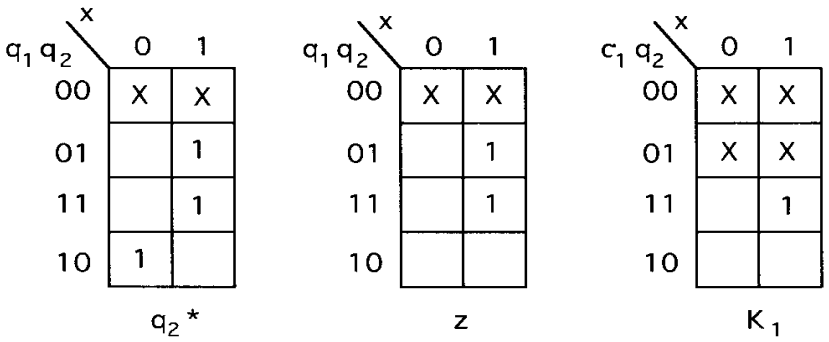
2. a)

	x	q_1	q_2	q_1*	q_2*	z	J_1	K_1	J_2	K_2
-	0	0	0	X	X	X	X	X	X	X
B	0	0	1	1	0	0	1	X	X	1
C	0	1	0	1	1	0	X	0	1	X
A	0	1	1	1	0	0	X	0	X	1
-	1	0	0	X	X	X	X	X	X	X
B	1	0	1	1	1	1	1	X	X	0
C	1	1	0	1	0	0	X	0	0	X
A	1	1	1	0	1	1	X	1	X	0

Without drawing the maps, we can see that

$D_1 = x' + q_1' + q_2'$ $\quad J_1 = 1$ $\quad J_2 = K_2 = x'$

Thus, we show maps only for D_2 (q_2*), z, and K_1.



$D_2 = x' q_2' + x q_2$ $\quad K_1 = x q_2$

$Z = q_2$