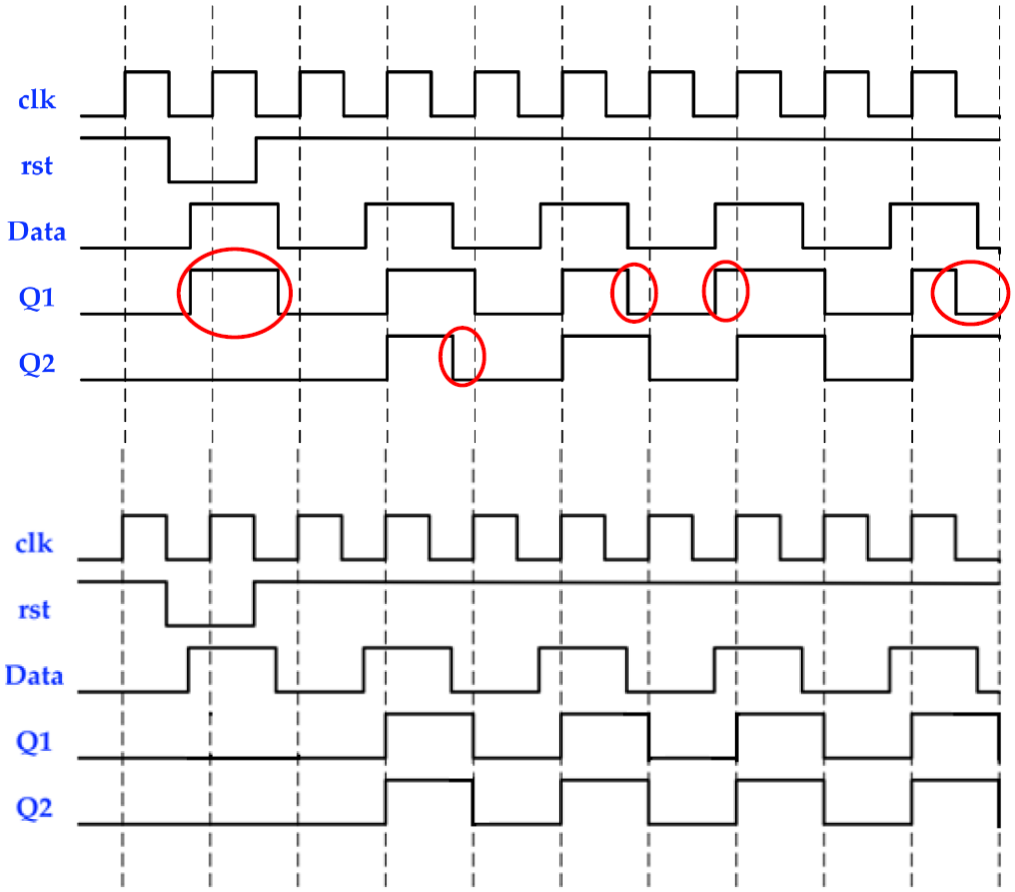
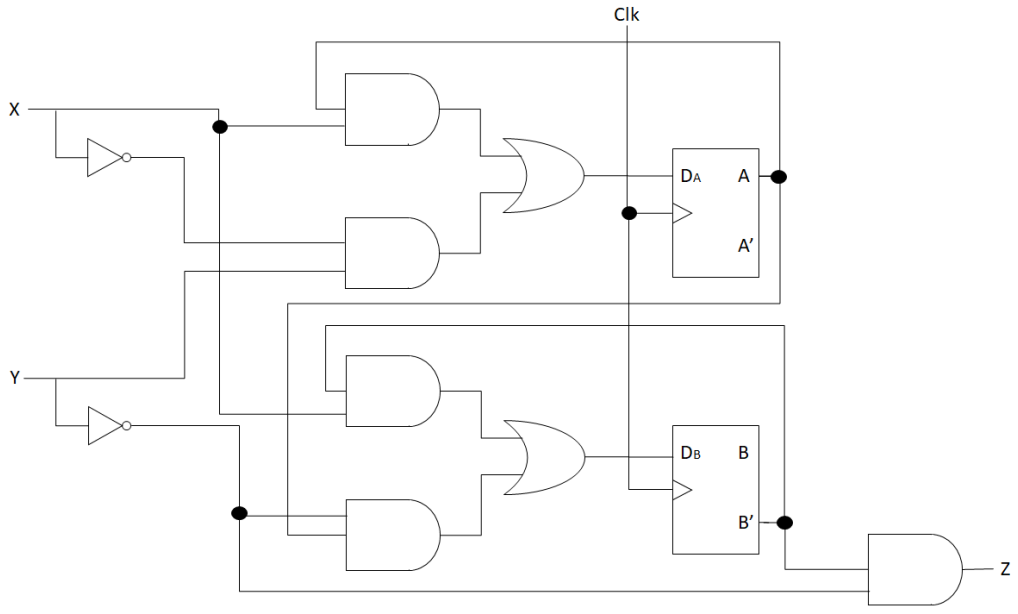
邏輯設計 HW6 Solution

1.(16%)



2.(18%)

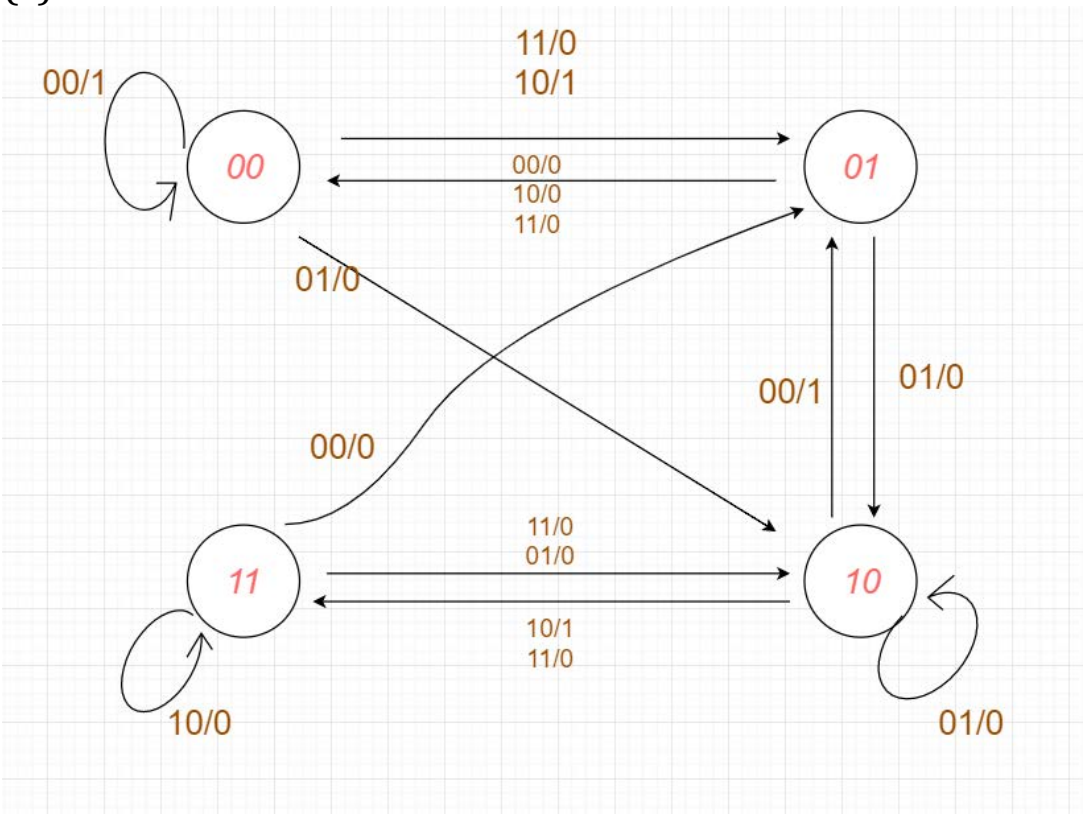


(a)

(b)

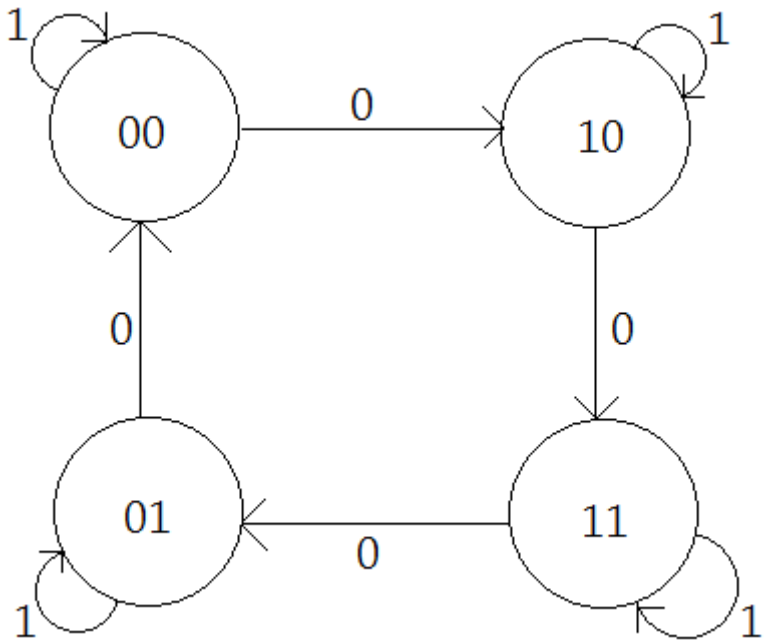
Present state		Input		Next state		Output
A	B	x	y	A+1	B+1	Z
0	0	0	0	0	0	1
0	0	0	1	1	0	0
0	0	1	0	0	1	1
0	0	1	1	0	1	0
0	1	0	0	0	0	0
0	1	0	1	1	0	0
0	1	1	0	0	0	0
0	1	1	1	0	0	0
1	0	0	0	0	1	1
1	0	0	1	1	0	0
1	0	1	0	1	1	1
1	0	1	1	1	1	0
1	1	0	0	0	1	0
1	1	0	1	1	0	0
1	1	1	0	1	1	0
1	1	1	1	1	0	0

(c)

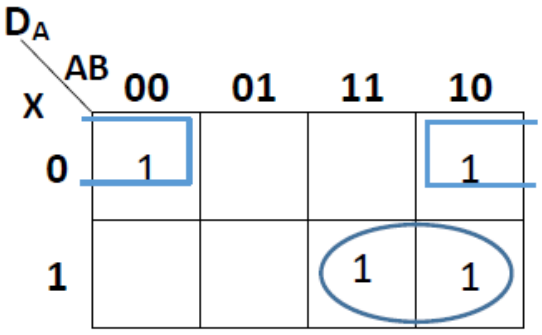


3.(16%)

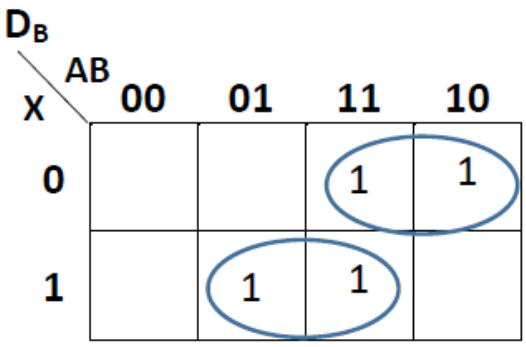
此電路沒有輸出，所以 state diagram 的箭頭只代表 input 的值



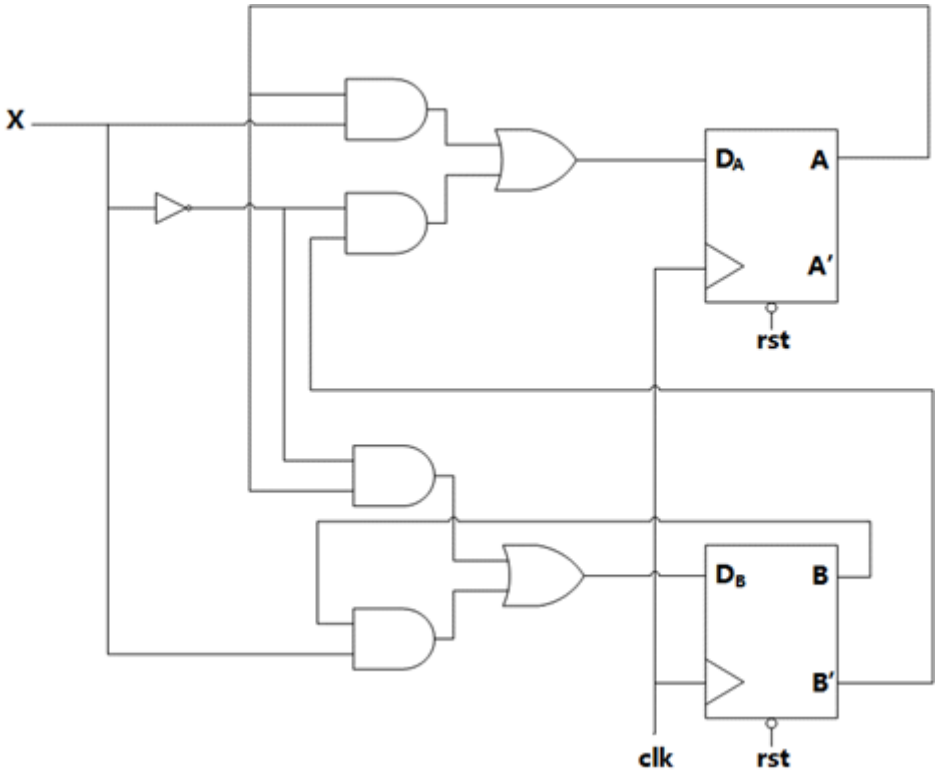
Present state		Input	Next state	
A	B	x	A+1	B+1
0	0	0	1	0
0	0	1	0	0
0	1	0	0	0
0	1	1	0	1
1	0	0	1	1
1	0	1	1	0
1	1	0	0	1
1	1	1	1	1



$D_A = B'X' + AX$



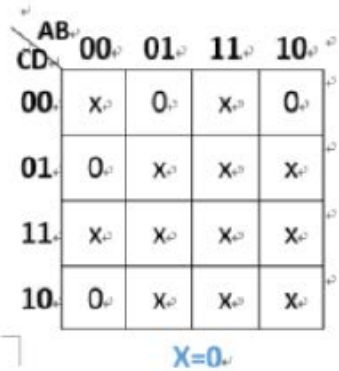
$D_B = AX' + BX$

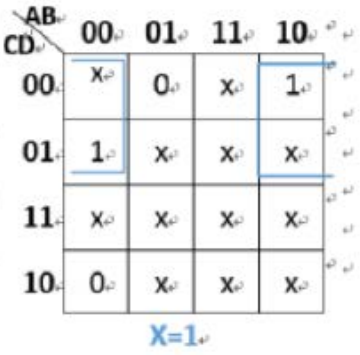

X
D_A
A
A'
rst
D_B
B
B'
clk
rst

4.(16%)

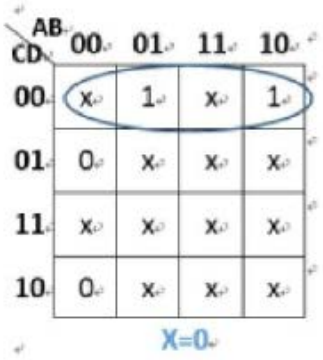
00→1000　01→0100　10→0010　11→0001

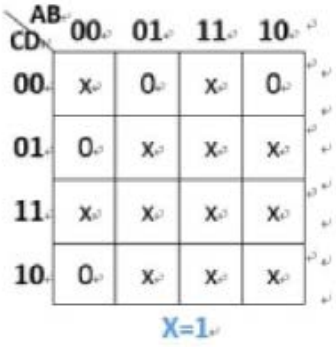
Present state				Input	Next state				Output
A	B	C	D	x	A_{n+1}	B_{n+1}	C_{n+1}	D_{n+1}	Y
1	0	0	0	0	0	1	0	0	1
1	0	0	0	1	1	0	0	0	1
0	1	0	0	0	0	1	0	0	0
0	1	0	0	1	0	0	1	0	0
0	0	1	0	0	0	0	0	1	0
0	0	1	0	1	0	0	1	0	0
0	0	0	1	0	0	0	0	1	0
0	0	0	1	1	1	0	0	0	0



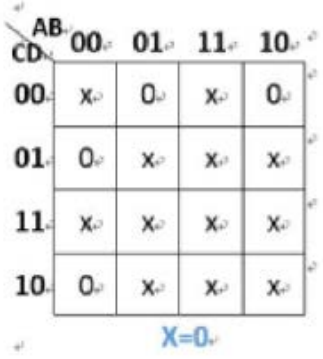


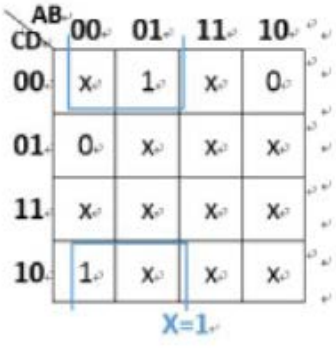
$D_A = B'C'X$



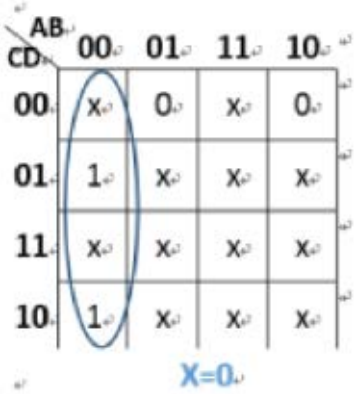


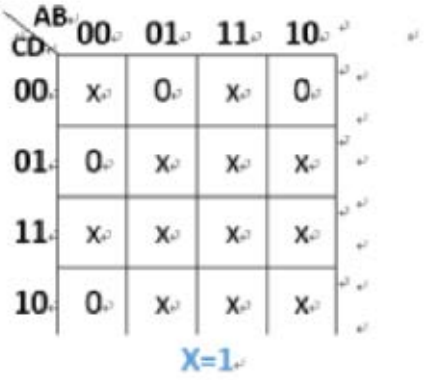
$D_B = C'D'X'$



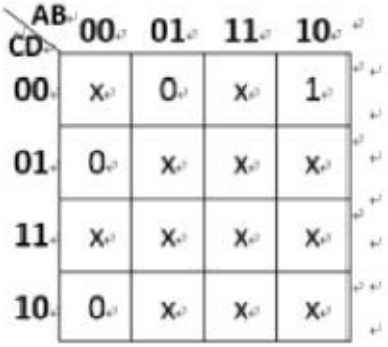


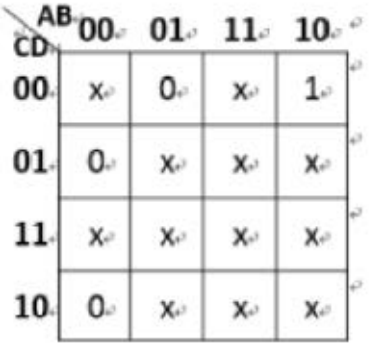
$D_C = A'D'X$



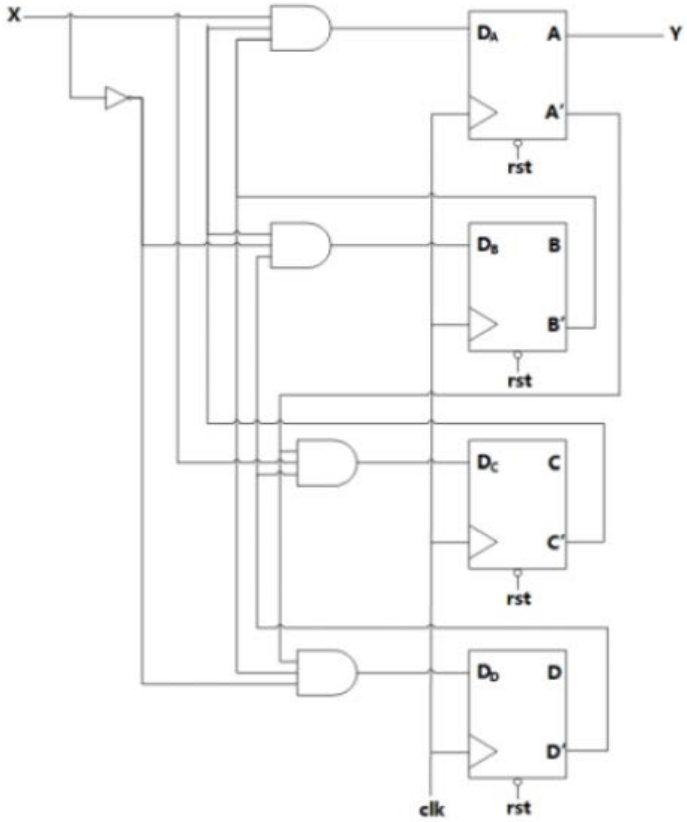


$D_D = A'B'X'$



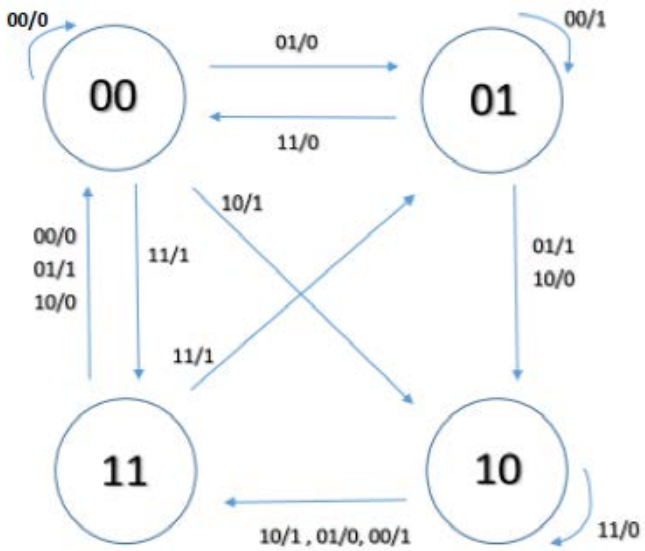


$Y = A$



註：此題 00→0001, 00→0010, 00→0100, 00→1000 亦可

5.(16%)



6.(18%)

Present State	Next State		Output	
	x=0	x=1	x=0	x=1
a	f	b	0	0
b	d	c	0	0
~~c~~	~~f~~	~~e~~	~~0~~	~~0~~
d	g	a	1	0
~~e~~	~~d~~	~~c~~	~~0~~	~~0~~
f	f	b	1	1
g	g	h	0	1
~~h~~	~~g~~	~~a~~	~~1~~	~~0~~

h → d
e → b
c → a

Present State	a	f	b	c	e	d	g	h	g	g	h
input	0	1	1	1	0	0	1	0	0	1	1
Next State	f	b	c	e	d	g	h	g	g	h	a
output	0	1	0	0	0	1	1	1	0	1	0

⇩ Reduced

Present State	Next State		Output	
	x=0	x=1	x=0	x=1
a	f	b	0	0
b	d	c	0	0
d	g	a	1	0
f	f	b	1	1
g	g	d	0	1

Present State	a	f	b	a	b	d	g	d	g	g	d
input	0	1	1	1	0	0	1	0	0	1	1
Next State	f	b	a	b	d	g	d	g	g	d	a
output	0	1	0	0	0	1	1	1	0	1	0