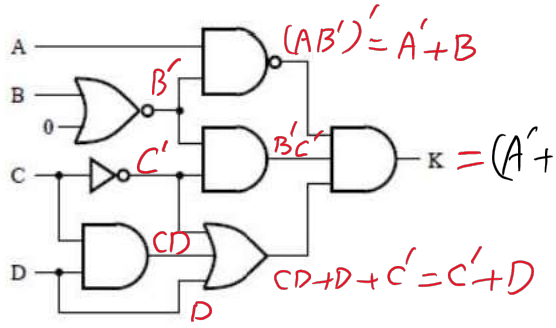
پاسخ امتحان میان ترم مدار منطقی ۱۴۰۳/۸/۲۸

۱-



$$K = (A' + B)B'C'(C' + D) = A'B'C'(C' + D)$$
$$= A'B'C' + A'B'C'D$$
$$= A'B'C' = A'B'C'D' + A'B'C'D$$
$$= \Sigma(0, 1)$$

۲- روشهای متعددی برای اثبات این دو رابطه وجود دارد.

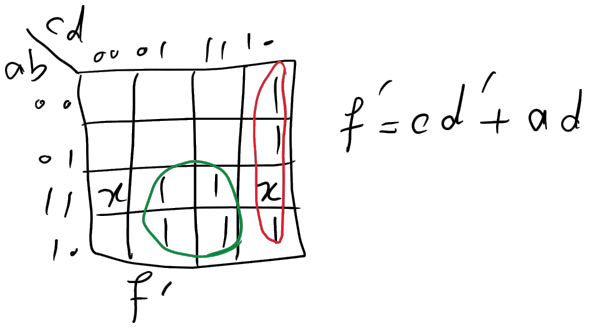
$$(a \oplus b \oplus c)' = (a \odot b \odot c)' = (a \odot p)' = a \oplus p = a \oplus (b \odot c) = a \oplus (b \oplus c)'$$

$$a \oplus b \oplus ab = (a \oplus b)'ab + (a \oplus b)(ab)' = (ab + a'b')ab + (ab' + a'b)(a' + b') =$$

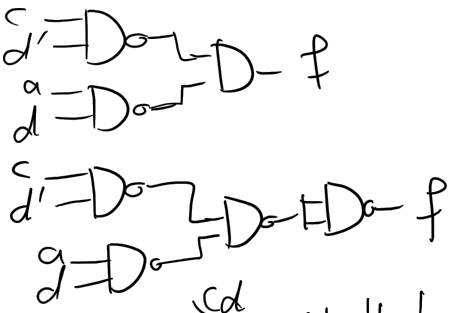
$$ab + ab' + a'b = a + a'b = a + b \Rightarrow$$

$$a \oplus c \oplus ac = a + c \rightarrow (a \oplus b \oplus ab)(a \oplus c \oplus ac) = (a + b)(a + c) = a + bc$$

۳-

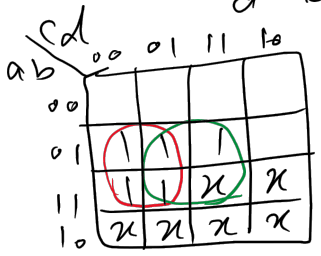


$f' = cd' + ad$

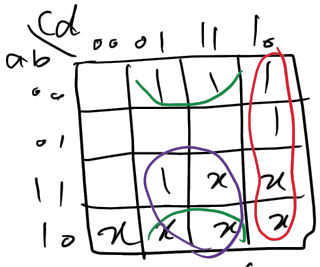


۴-

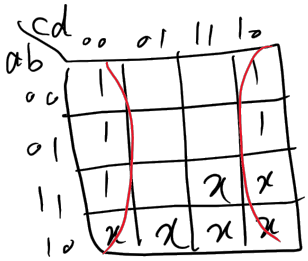
a b c d	w x y z
0 0 0 0	0 0 1 1
0 0 0 1	0 1 0 0
0 0 1 0	0 1 0 1
0 0 1 1	0 1 1 0
0 1 0 0	0 1 1 1
0 1 0 1	1 0 0 0
0 1 1 0	1 0 0 1
0 1 1 1	1 0 1 0
1 0 0 0	1 0 1 1
1 0 0 1	1 1 0 0



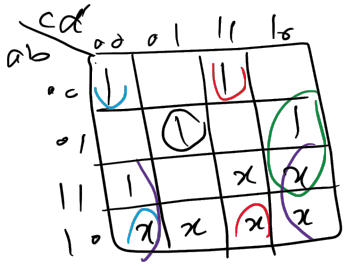
$w = bc' + bd$



$x = cd' + ad + b'd$

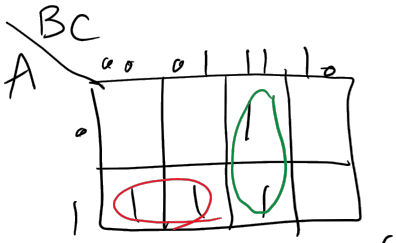


$y = d'$

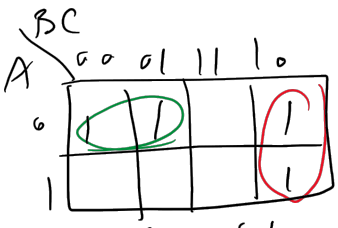


$z = b'cd + b'c'd' + ad' + bcd' + a'bc'd$

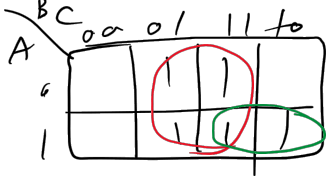
۵- نمی توان گیت مشترکی بین گیتها بدست آورد.



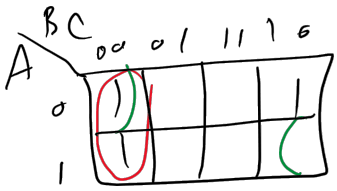
$F_1 = BC + AB'$



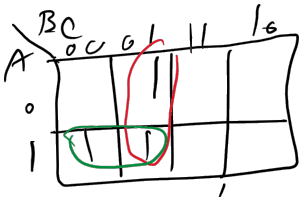
$F_1' = A'B' + BC'$



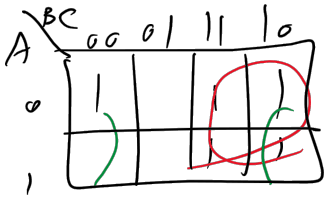
$F_2 = AB + C$



$F_2' = BC' + A'C'$



$F_3 = B'C + AB'$



$F_3' = A'C' + B$

A	B	C	F_1	F_2	F_3
—	1	1	1	—	—
1	0	—	1	—	1
—	0	1	—	—	1
—	0	0		1	
0	—	0		1	
			T	C	T

۶-

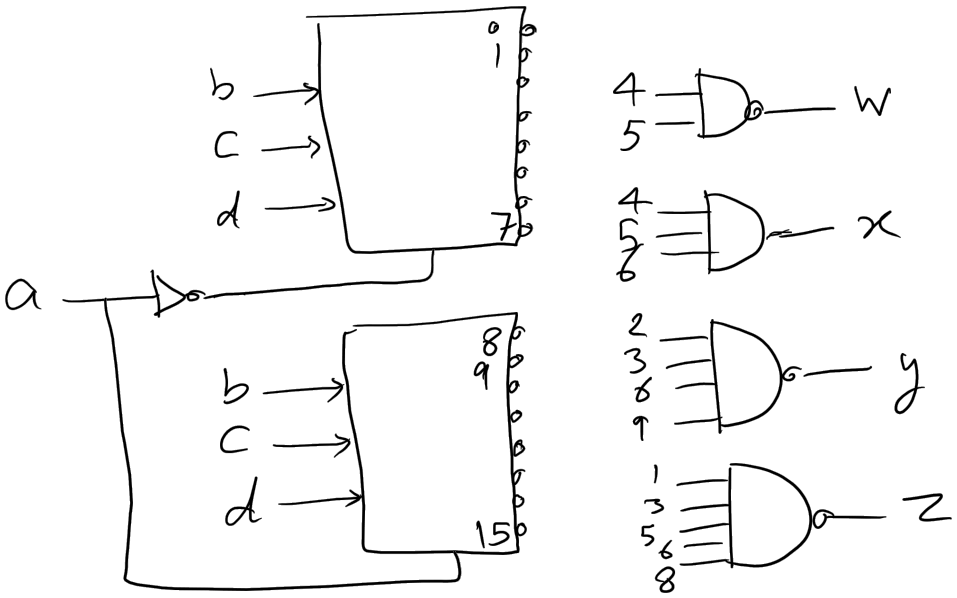
a	b	c	d	w	x	y	z
*	*	0	0	0	1	0	0
*	0	0	1	0	1	0	1
0	0	1	0	0	1	1	0
0	0	1	1	0	1	1	1
0	1	0	0	1	0	0	0
0	1	0	1	1	0	0	1
0	1	1	0	0	0	1	1
0	1	1	1	0	1	0	0
1	0	0	0	0	1	0	1
1	0	0	1	0	1	1	0

$w = \sum(4,5) + d(10,11,12,13,14,15)$

$x = \sum(0,1,2,3,7,8,9) + \sim$

$y = \sum(2,3,6,9) + \sim$

$z = \sum(1,3,5,6,8) + \sim$



ب-

	I_0	I_1	I_2	I_3
$a'b'$	0	1	2	3
$a'b$	4	5	6	7
ab	12	13	14	15
ab'	8	9	10	11
w	b	b	0	0

	I_0	I_1	I_2	I_3
$a'b'$	0	1	2	3
$a'b$	4	5	6	7
ab	12	13	14	15
ab'	8	9	10	11
x	b'	b'	b'	a'

	I_0	I_1	I_2	I_3
$a'b'$	0	1	2	3
$a'b$	4	5	6	7
ab	12	13	14	15
ab'	8	9	10	11
y	0	a	a'	b'

	I_0	I_1	I_2	I_3
$a'b'$	0	1	2	3
$a'b$	4	5	6	7
ab	12	13	14	15
ab'	8	9	10	11
	a	a'	b	b'

چون هیچیک از خروجی ها برابر ورودیها یا هیچیک از خروجیها صفر و یا یک نیستند، اندازه ROM برابر ۴×۱۶ است.