0 0 1

Given F(a,b,c) = ∑m(1,2), and G(c,b,a) = ∑m(1,2). Is F=G?

0 1 0

A. Yes

B. No

F = a'b'c + a'bc'

G = c'b'a + c'ba'
= ab'c' + a'bc'

Given 5-bit unsigned input, output Z=1 iff decimal value of input is between 27 and 29 (inclusive). Z in Sum-of-minterm is:

A. $\sum m(27, 28, 29)$
B. $\sum m(20, 21, 22)$
C. $\sum m(30, 31, 32)$

	a	b	c	d	e	Z
m0	0	0	0	0	0	0
	•	•	•	•	•	0
m27	1	1	0	1	1	1
m28	1	1	1	0	0	1
m29	1	1	1	0	1	1
	•	•	•	•	•	0
m31	1	1	1	1	1	0

$$Z(a,b,c,d,e) = \sum m\ (27, 28, 29)$$

$$Z = abc'de + abcd'$$

Given 5-bit unsigned input, output F*=0 iff decimal value of input is between 27 and 29 (inclusive). F* in Product-of-maxterm is:

A. $\Pi\, M(27, 28, 29)$
B. $\Pi\, M(20, 21, 22)$
C. $\Pi\, M(30, 31, 32)$

	a	b	c	d	e	F*	Z
M0	0	0	0	0	0	1	0
	•	•	•	•	•	1	0
M27	1	1	0	1	1	0	1
M28	1	1	1	0	0	0	1
M29	1	1	1	0	1	0	1
	•	•	•	•	•	1	0
M31	1	1	1	1	1	1	0

$$F^* = (a'+b'+c+d'+e')(a'+b'+c'+d+e)(a'+b'+c'+d+e')$$

$$F^* = (a'+b'+c+d'+e')(a'+b'+c'+d)$$

Task: show algebraically that F*' = Z

$$F^* = (a'+b'+c+d'+e')(a'+b'+c'+d)$$

$$F^{*\prime} = \left[(\quad)(\quad)\right]'$$

$$= (\quad)' + (\quad)'$$

Hint:
- Take (F*)',
- apply DeMorgan's theorems

$$Z = abc'de + abcd'$$

How many loops needed for minimum-cost SOP on this K-map?

X		C,D 00	01	11	10
A,B	00	0	0	0	0
	01	1	0	0	1
	11	0	0	1	1
	10	0	0	1	0

A. 1

B. 2

C. 3

D. 4

3 loops of 2 minterms each

X		C,D			
		00	01	11	10
	00	0	0	0	0
A,B	01	1	0	0	1
	11	0	0	1	1
	10	0	0	1	0

$$X = ACD + A'BD' + BCD' \qquad \text{(eq. 1)}$$

Alternative answer (3 loops)

X		C,D			
		00	01	11	10
	00	0	0	0	0
A,B	01	1	0	0	1
	11	0	0	1	1
	10	0	0	1	0

X = ACD + A’BD’ + ABC (eq. 2)

How many loops needed for minimum-cost POS on the same K-map?

X		C,D			
		00	01	11	10
	00	0	0	0	0
A,B	01	1	0	0	1
	11	0	0	1	1
	10	0	0	1	0

A. 1

B. 2

C. 3

D. 4

3 loops of 4 maxterms each

X	C,D			
A,B	00	01	11	10
00	0	0	0	0
01	1	0	0	1
11	0	0	1	1
10	0	0	1	0

$$X = (B+D)\ (A'+C)\ (A+D') \qquad \text{(eq. 3)}$$

All 3 expressions are same algebraically

$X = (B+D)(A'+C)(A+D')$ (eq. 3)

$= (A'B + A'D + BC + CD)(A+D')$

$= A'BD' + ABC + BCD' + ACD$

$= ACD + A'BD' + ABC + BCD'$

Compare with

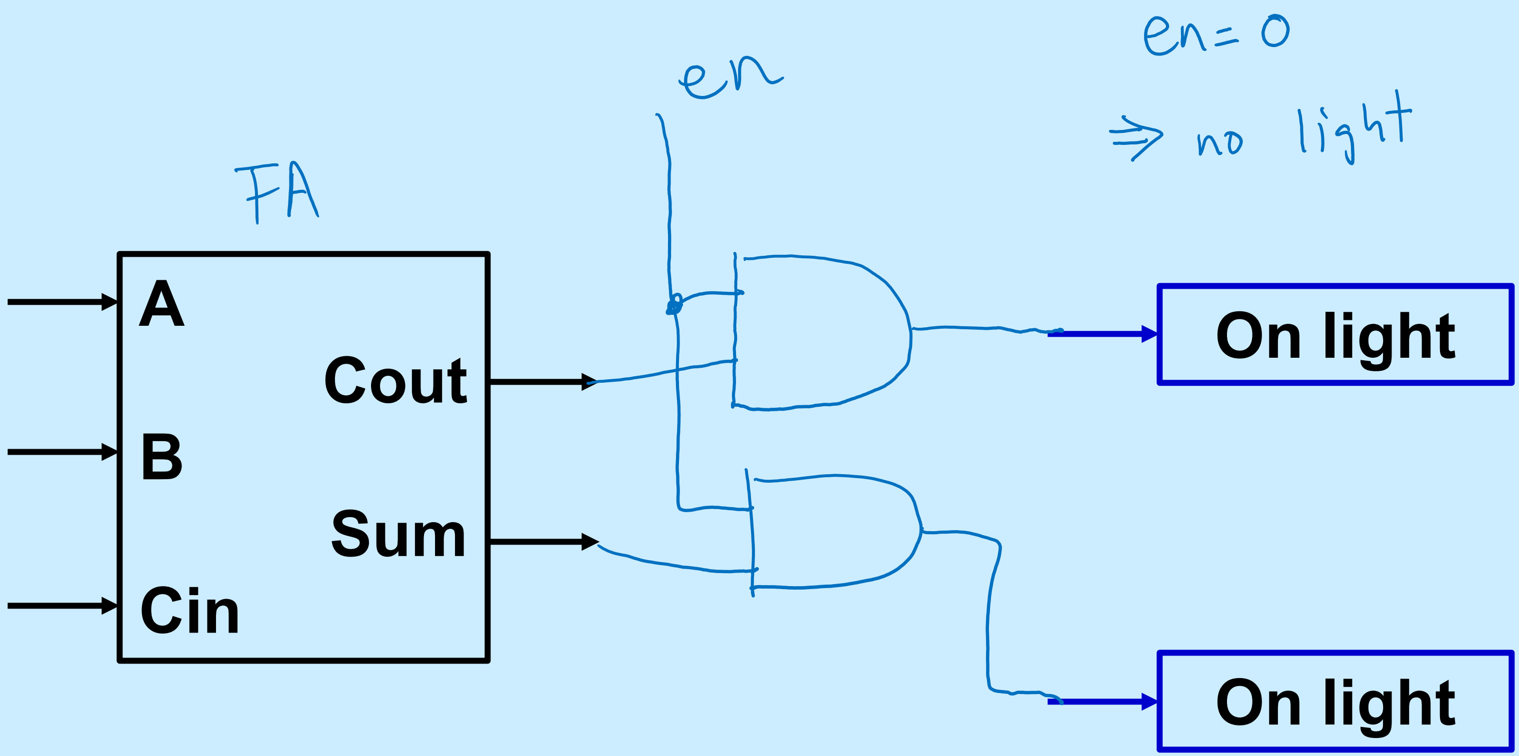
$X = ACD + A'BD' + BCD'$ (eq. 1)

$ABC(D+D')$ is absorbed in ACD and BCD'

$X = ACD + A'BD' + ABC$ (eq. 2)

$(A'+A)BCD'$ is absorbed in $A'BD'$ and ABC

Case(a) active-Hi enable + light with active-Hi input



Case(b) active-Lo enable + light with active-Lo input

en* = 1

⇒ no light