

BLG231E - Assignment 3

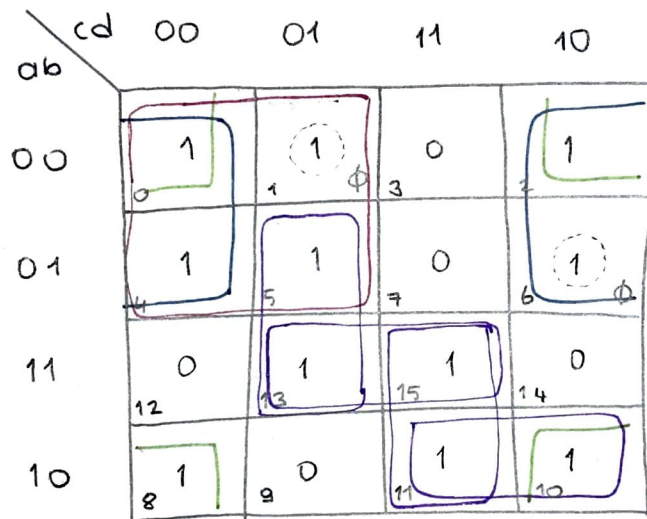
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1. $F(a,b,c,d) = \sum (0,2,4,5,8,10,11,13,15) + \sum \phi (1,6)$

a.



All prime implicants:

$$5, 13 \rightarrow bc'd$$

$$0, 1, 4, 5 \rightarrow a'c'$$

$$13, 15 \rightarrow abd$$

$$0, 2, 4, 6 \rightarrow a'd'$$

$$11, 15 \rightarrow acd$$

$$0, 2, 8, 10 \rightarrow b'd'$$

$$11, 10 \rightarrow ab'c$$

b.

	a	b	c	d	
0	0	0	0	0	✓
1	0	0	0	1	✓
2	0	0	1	0	✓
4	0	1	0	0	✓
8	1	0	0	0	✓
5	0	1	0	1	✓
6	0	1	1	0	✓
10	1	0	1	0	✓
11	1	0	1	1	✓
13	1	1	0	1	✓
15	1	1	1	1	✓

Groups with 4 points

	a	b	c	d	
0,1,4,5	0	-	0	-	✓
0,2,4,6	0	-	-	0	✓
0,2,8,10	-	0	-	0	✓
0,4,1,5	0	-	0	-	} repeated
0,4,2,6	0	-	-	0	
0,8,2,10	-	0	-	0	

Groups with 2 points

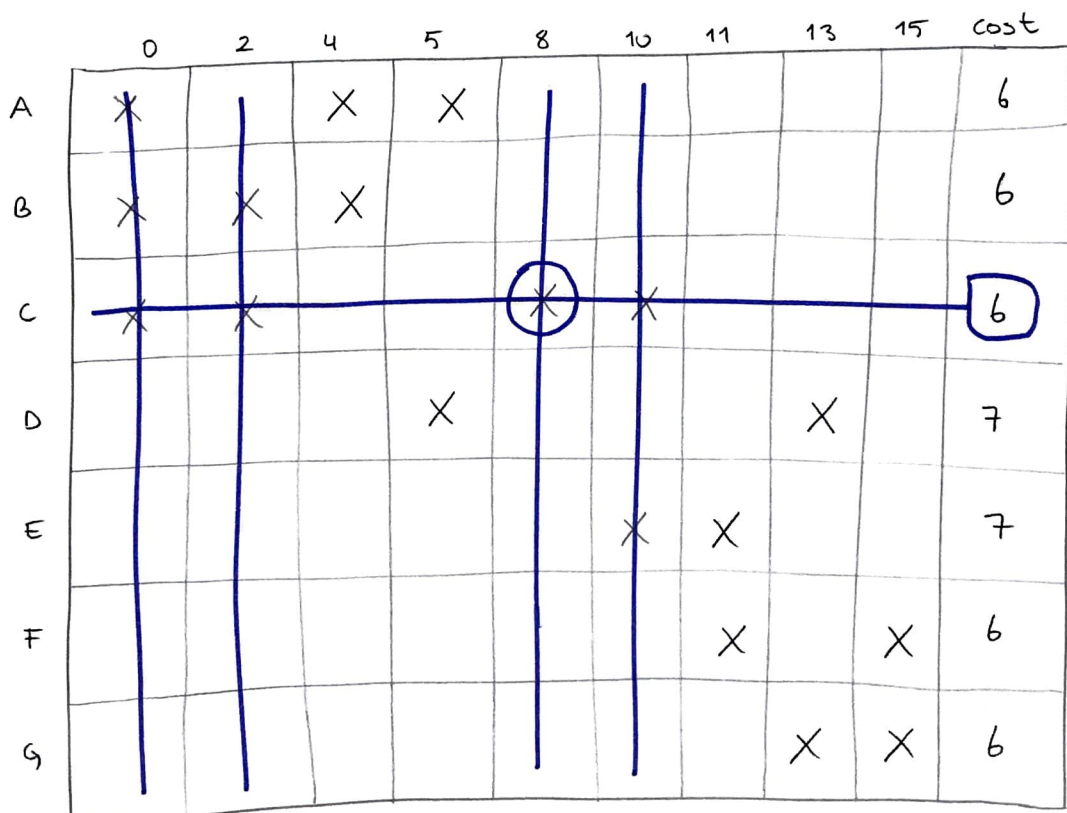
	a	b	c	d	
0,1	0	0	0	-	✓
0,2	0	0	-	0	✓
0,4	0	-	0	0	✓
0,8	-	0	0	0	✓
1,5	0	-	0	1	✓
2,6	0	-	1	0	✓
2,10	-	0	1	0	✓
4,5	0	1	0	-	✓
4,6	0	1	-	0	✓
8,10	1	0	-	0	✓
5,13	-	1	0	1	
10,11	1	0	1	-	
11,15	1	-	1	1	
13,15	1	1	-	1	

Prime implicants:

$$\left\{ \begin{array}{l} a'c' \\ a'd' \\ b'd' \\ bc'd \\ ab'c \\ acd \\ abd \end{array} \right\}$$

2.

	a'c'	a'd'	b'd'	bc'd	ab'c	acd	abd
Symbols	A	B	C	D	E	F	G
Costs	6	6	6	7	7	6	6
points covered	0,4,5	0,2,4	0,2,8,10	5,13	10,11	11,15	13,15



* C is essential prime implicant because of 8.

	4	5	11	13	15	cost
A	*	*				6
B	*					6
D		*		*		7
E			*			7
F			*		*	6
G				*	*	6

* A covers B , same costs.

	11	13	15	cost
B				6
D		*		7
E	*			7
F	*		*	6
G		*	*	6

* F covers E , cheaper cost.

* G covers D , cheaper cost

So, $C + A + F + G$

$$\text{Total cost} = 6 + 6 + 6 + 6 = 24$$

Essential prime implicant:

$b'd'$, $a'c'$, acd , abd