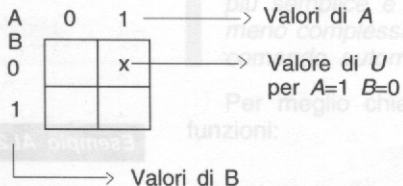
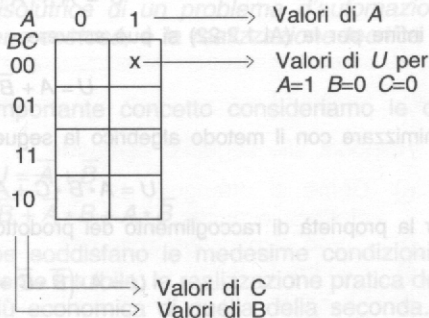


Mappa vuota della funzione $U = f(A,B)$



Mappa vuota della funzione $U = f(A,B,C)$



Mappa vuota della funzione $U = f(A,B,C,D)$

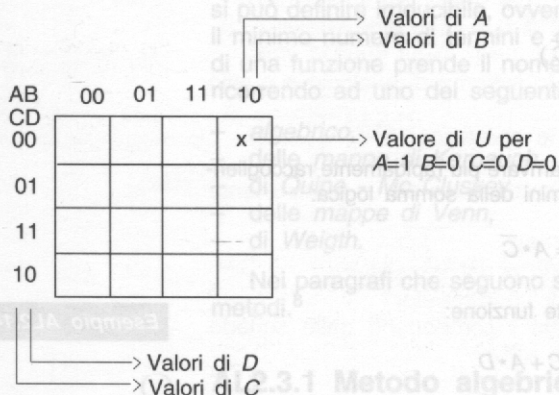


Fig. AL2.96 - Forme mappali vuote.

A	0	1
B		
0	X_1	X_2
1	X_3	X_4

A	0	1
B		
0	1	1
1	0	1

$$X_1 = 0 \cdot 0 + 0 \cdot \bar{0} + \bar{0} \cdot \bar{0} = 0 \cdot 0 + 0 \cdot 1 + 1 \cdot 1 = 1$$

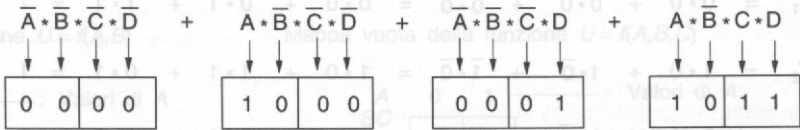
$$X_2 = 1 \cdot 0 + 1 \cdot \bar{0} + \bar{1} \cdot \bar{0} = 1 \cdot 0 + 1 \cdot 1 + 0 \cdot 1 = 1$$

$$X_3 = 0 \cdot 1 + 0 \cdot \bar{1} + \bar{0} \cdot \bar{1} = 0 \cdot 1 + 0 \cdot 0 + 1 \cdot 0 = 0$$

$$X_4 = 1 \cdot 1 + 1 \cdot \bar{1} + \bar{1} \cdot \bar{1} = 1 \cdot 1 + 1 \cdot 0 + 0 \cdot 0 = 1$$

A	B	U
0	0	1
0	1	1
1	0	1
1	1	0

A	0	1
B		
0	1	1
1	1	0



Combinazione che rende pari ad 1
 il prodotto $\bar{A} * \bar{B} * \bar{C} * \bar{D}$

AB CD	00	01	11	10	—
00	1	0	0	1	—
01	1	0	0	0	—
11	0	0	0	1	—
10	0	0	0	0	—

Fig. AL2.100 - Metodo grafico per l'individuazione dei prodotti pari ad 1.

$$(C + C + \bar{B} + A) * (C + \bar{C} + B + A) *$$

$$A * B + \bar{A} * B + A * \bar{B}$$

0	1
1	1

0	0
1	1

0	1
1	0

A
B
0
1

0	0	1
1	1	1

Il procedimento è descritto nella Fig. AL2.102.

Prima di passare ad illustrare il metodo di minimizzazione di Karnaugh mostriamo quanto affermato circa la sua applicabilità anche al caso di funzione in forma non canonica.

Consideriamo la funzione

$$A * B * C + \bar{A} * B * C + A * \bar{B} * C + \bar{A} * \bar{B} * C + A * B * \bar{C}$$

1	1	1
---	---	---

0	1	1
---	---	---

1	0	1
---	---	---

0	0	1
---	---	---

1	1	0
---	---	---

A	0	1
BC		
00	0	0
01	1	1
11	1	1
10	0	1

$$A \cdot B \cdot \bar{C} \cdot \bar{D}$$

+

$$A \cdot \bar{B} \cdot \bar{C} \cdot \bar{D}$$

+

$$A \cdot B \cdot C \cdot \bar{D}$$

+

$$A \cdot \bar{B} \cdot C \cdot \bar{D}$$

1	1	0	0
---	---	---	---

1	0	0	0
---	---	---	---

1	1	1	0
---	---	---	---

1	0	1	0
---	---	---	---

AB

CD

00

01

11

10

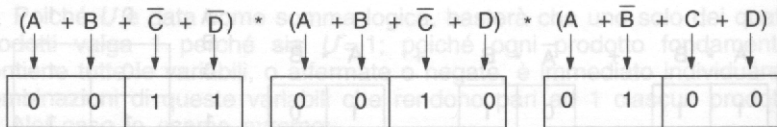
00

01

11

10

0	0	1	1
0	0	0	0
0	0	0	0
0	0	1	1



> Combinazione che rende pari a 0

La somma $A + B + \bar{C} + \bar{D}$

AB	00	01	11	10
CD				
00	1	0	1	1
01	1	1	1	1
11	0	1	1	1
10	0	1	1	1

$$U = (A + B) * (\bar{A} + B) * (A + \bar{B})$$

Il procedimento è descritto nella Fig. AL2.106.

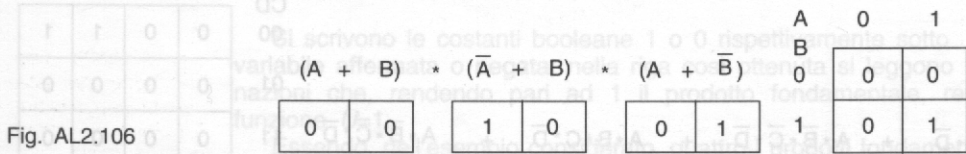
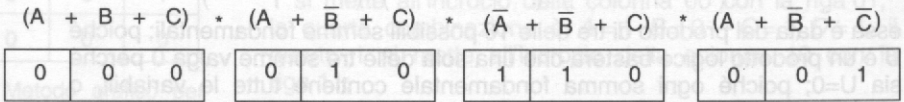


Fig. AL2.106

A	0	1
BC		
00	0	1
01	0	1
11	1	1
00	0	0

Il procedimento è descritto nella Fig. AL2.107.



$$D + \bar{C} + B + \bar{A} + \bar{D} + C + (B) + A + \bar{B} + \bar{C} + D = B + C + D$$

La caratteristica più importante del teorema è cost...

dal fatto che i prodotti canonici, cui può essere applicato...

s'individuano immediatamente sulla mappa delle funzioni...

essi sono quelli corrispondenti a tutti i valori...

$$(A + B + \bar{C} + \bar{D}) * (A + \bar{B} + \bar{C} + \bar{D})$$

0	0	1	1
---	---	---	---

0	1	1	0	1
---	---	---	---	---

AB
CD
00
01
11
10

	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	0	0	1	1
10	1	1	1	1

$$U = A + B + C + A + \bar{B} + C + A + B + C$$

$$A * B * (C) * D +$$

A	B	(C)	D
↓	↓	↓	↓
1	1	0	1
1	1	1	1

$$(A) * B * C * D +$$

(A)	B	C	D
↓	↓	↓	↓
0	1	1	1
1	1	1	1

$$\bar{A} * (B) * C * \bar{D}$$

\bar{A}	(B)	C	\bar{D}
↓	↓	↓	↓
0	0	1	0
0	1	1	0

→ Combinazioni che rendono pari ad 1
il prodotto $A * B * C * D$

AB	00	01	11	10
CD				
00	0	0	0	0
01	0	0	1	0
11	0	1	1	0
10	1	1	0	0

$$A * B * C * (D) + (A) * B * \bar{C} * D + A * (B) * C * \bar{D} + \bar{A} * B * C * D$$

1	1	1	1
1	1	1	0

1	1	0	1
0	1	0	1

1	1	1	0
1	0	1	0

0	1	1	1
---	---	---	---

AB 00 01 11 10

CD

00	0	0	0	0
01	0	1	1	0
11	0	1	1	0
10	0	0	1	1

Fig. AL2.111

A

0

1

BC

00

1

0

01

0

1

11

0

1

10

0

0

$A \cdot \bar{B} \cdot C$

$A \cdot B \cdot C$

AB	00	01	11	10
CD				
00	1	1		
01			1	
11	1		1	
10	1			

AB	00	01	11	10
CD				
00	1			
01				
11				
10	1			

AB	00	01	11	10
CD				
00				
01				
11	1			1
10				

AB	00	01	11	10
CD				
00				
01			1	1
11			1	1
10				

AB	00	01	11	10
CD				
00		1	1	
01				
11				
10		1	1	

AB	00	01	11	10
CD				
00				
01	1			1
11	1			1
10				

AB	00	01	11	10
CD				
00	1			1
01				
11				
10	1			1

AB 00 01 11 10

CD	00	01	11	10
00		1		
01		1		
11		1		
10		1		

AB 00 01 11 10

CD	00	01	11	10
00				
01	1	1	1	1
11				
10				

AB 00 01 11 10

CD	00	01	11	10
00				
01	1	1	1	1
11	1	1	1	1
10				

AB 00 01 11 10

CD	00	01	11	10
00	1			1
01	1			1
11	1			1
10	1			1

AB 00 01 11 10

CD	00	01	11	10
00	1	1		
01	1	1		
11	1	1		
10	1	1		

AB 00 01 11 10

CD	00	01	11	10
00	1	1	1	1
01				
11				
10	1	1	1	1

AB CD	00	01	11	10
000	1	1	1	1
001	1	1	1	1
011	1	1	1	1
010	1	1	1	1
110				
111				
101				
100				

AB CD	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

AB 00 01 11 10

CD

00

--	--	--	--

$$\bar{A} * B * \bar{C} * D$$

01

	1	1	
--	---	---	--

$$A * B * \bar{C} * D$$

11

	1	1	
--	---	---	--

$$A * B * C * D$$

10

--	--	--	--

$$\bar{A} * B * C * D$$

AB	00	01	11	10
CD				
00	1	1	1	1
01	1	1	1	1
11	0	0	0	0
10	0	0	0	0

$$A \cdot B \cdot C + \bar{A} \cdot B \cdot C + A \cdot \bar{B} \cdot C + \bar{A} \cdot \bar{B} \cdot C + A \cdot B \cdot \bar{C}$$

1	1	1
---	---	---

0	1	1
---	---	---

1	0	1
---	---	---

0	0	1
---	---	---

1	1	0
---	---	---

A	0	1	
BC			
00	0	0	
01	1	1	→ C
11	1	1	
10	0	1	→ A + B

Fig. AL2.119

Continua

F7: B

H7: U

D9: 0

D10: 0

D11: 1

$$A \cdot B \cdot \bar{C} \cdot \bar{D} + A \cdot \bar{B} \cdot \bar{C} \cdot \bar{D} + A \cdot B \cdot C \cdot \bar{D} + A \cdot \bar{B} \cdot C \cdot \bar{D}$$

1	1	0	0
---	---	---	---

1	0	0	0
---	---	---	---

1	1	1	0
---	---	---	---

1	0	1	0
---	---	---	---

AB 00 01 11 10

CD

00

0	0	1	1
---	---	---	---

01

0	0	0	0
---	---	---	---

11

0	0	0	0
---	---	---	---

10

0	0	1	1
---	---	---	---

→ $A \cdot \bar{D}$

AB	00	01	11	10	
CDE 000	1	1	1	1	→ $\bar{A} * \bar{E}$
001	1	1	1	1	
011	1	1	1	1	
010	0	1	1	0	→ $A * D$
110	0	1	1	0	
111	1	1	1	1	→ $B * \bar{D}$
101	1	0	0	1	
100	0	0	0	0	