

Resolução da Lista 5 da disciplina de Matemática Discreta

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3. Formas disjuntivas mínimas

1.

a. $\{\alpha = ab' + abc' + a'bc', \pi = ac'\}$

$\therefore \alpha = abc + ab'c' + abc' + a'bc'$

Mapa de Karnaugh:

\backslash	bc	bc'	b'c'	b'c
a		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
a'		<input checked="" type="checkbox"/>		

Logo, $\alpha = ab' + bc' \therefore \pi \not\subset \alpha$

b. $\{\alpha = ab + ab'c' + a'b'c', \pi = ab'\}$

$\therefore \alpha = abc + abc' + ab'c' + a'b'c'$

\backslash	bc	bc'	b'c'	b'c
a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
a'				<input checked="" type="checkbox"/>

Logo, $\alpha = ab + ac' + a'b'c' \therefore \pi \not\subset \alpha$

c. $\{\alpha = c + abc + abc', \pi = ab\}$

$\therefore \alpha = ab'c + a'bc + a'b'c + abc + abc'$

\backslash	bc	bc'	b'c'	b'c
a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
a'	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>

Logo, $\alpha = c + ab = c + \pi \therefore \pi \subset \alpha$

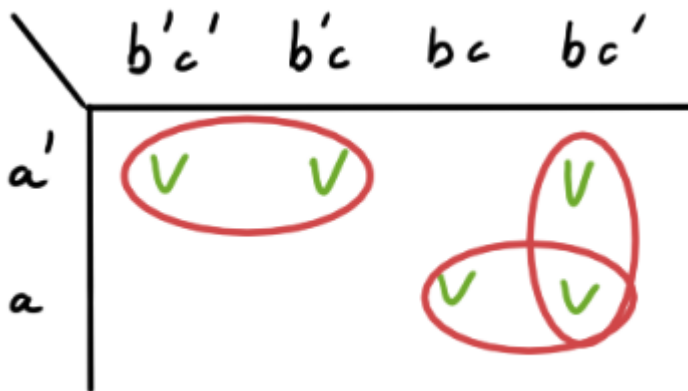
d. $\{\alpha = a'bc + ab'c + abc, \pi = abc \therefore \pi \subset \alpha$

2.

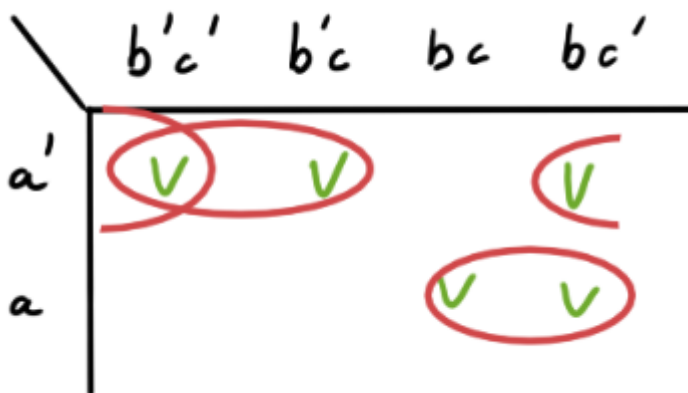
a. $\alpha = abc + abc' + a'c' + a'b'c + a'bc'$

$$= abc + abc' + a'b'c' + a'b'c + a'bc'$$

São **duas** as possíveis formas disjuntivas mínimas:



$$\alpha = b'c' + a'b' + ab$$



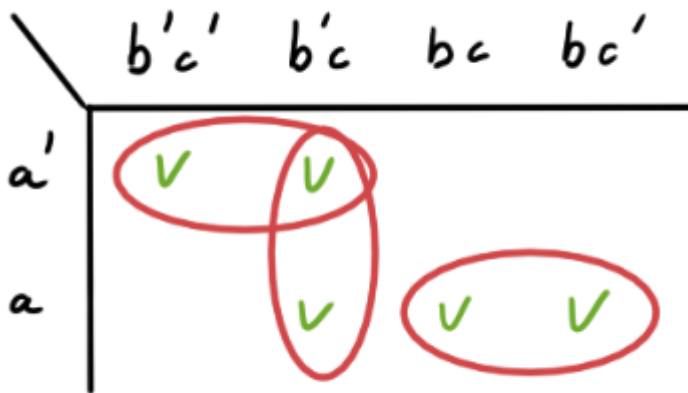
$$\alpha = ab + ac' + a'b'$$

$$\mathbf{b.} \beta = ab + a'(b' + c') + bc' = \underline{ab + a'b' + a'c' + bc'} = abc + abc' + a'b'c + a'b'c' + a'bc'$$

São **duas** as possíveis formas disjuntivas mínimas:



$$\beta = a'b' + ac + ab$$



$$\beta = a'b' + b'c + ab$$

$$c. \gamma = a + bc + a'b'c' = abc + abc' + ab'c + ab'c' + a'bc + a'b'c'$$

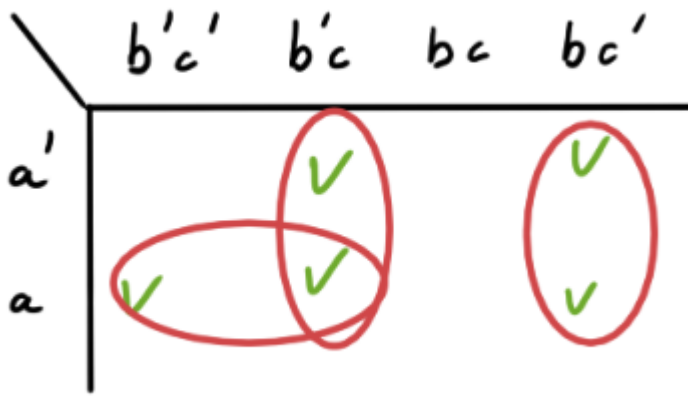
\	bc	bc'	b'c'	b'c
a	✓	✓	✓	✓
a'	✓		✓	

Existe apenas **uma** forma disjuntiva mínima possível:

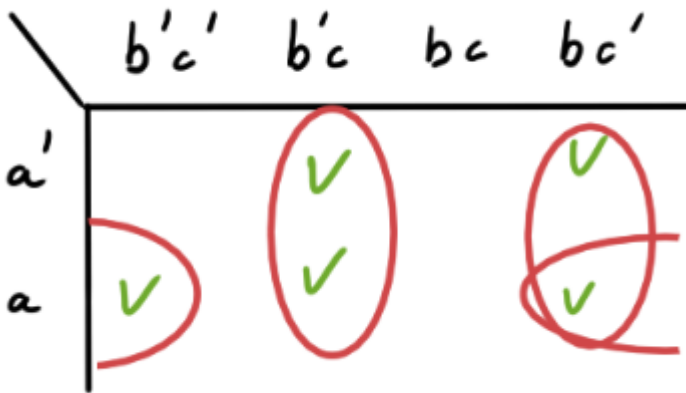
$$\gamma = a + bc + b'c'$$

$$d. \delta = abc' + ab'c + ab'c' + a'bc' + a'b'c$$

Existem **duas** formas disjuntivas mínimas possíveis:



$$\delta = ab' + bc' + b'c$$



$$\delta = ac' + bc' + b'c$$

$$e. \eta = abc + abc' + ab'c' + a'b'c$$

\	bc	bc'	b'c'	b'c
a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
a'				<input checked="" type="checkbox"/>

Existe apenas **uma** forma disjuntiva mínima possível:

$$\eta = ab + ac' + a'b'c$$

$$f. \mu = abc + abc' + ab'c + ab'c' + a'bc + a'bc' + a'b'c + a'b'c'$$

\	bc	bc'	b'c'	b'c
a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
a'	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Existe apenas **uma** forma disjuntiva mínima possível:

$$\mu = 1$$

$$g. \nu = ab + a'bc' + a'b'c = abc + abc' + a'bc' + a'b'c$$

\	bc	bc'	b'c'	b'c
a	✓	✓		
a'		✓		✓

Existe apenas **uma** forma disjuntiva mínima possível:

$$\therefore \nu = ab + bc' + a'b'c$$

$$h. \rho = ac + abc' + a'bc + a'b'c = abc + ab'c + abc' + a'bc + a'b'c$$

\	bc	bc'	b'c'	b'c
a	✓		✓	✓
a'	✓			✓

Existe apenas **uma** forma disjuntiva mínima possível:

$$\rho = ab' + c$$

3.

$$a. \alpha = \sum m(3, 5, 7, 13, 14, 15) = 0011, 0101, 0111, 1101, 1110, 1111$$

\	*00 (z'w') *	01 (z'w)	11 (zw)	10 (zw')
00 (x'y')			✓	
01 (x'y)		✓	✓	
11 (xy)		✓	✓	✓
10 (xy')				

Existe apenas **uma** forma disjuntiva mínima possível:

$$\alpha(x, y, z, w) = yw + x'zw + xyz$$

$$b. \beta = \sum m(3, 4, 5, 6, 7, 8, 12) = 0011, 0100, 0101, 0110, 0111, 1000, 1100$$

\	00 (z'w')	01 (z'w)	11 (zw)	10 (zw')
00 (x'y')			✓	
01 (x'y)	✓	✓	✓	✓
11 (xy)	✓			
10 (xy')	✓			

Existe apenas **uma** forma disjuntiva mínima possível:

$$\beta(x, y, z, w) = xz'w' + x'y + x'zw$$

$$c. \gamma = \sum m(0, 1, 2, 3, 4, 5, 6, 7) = 000, 001, 010, 011, 100, 101, 110, 111$$

\	00 (y'z')	01 (y'z)	11 (yz)	10 (yz')
0 (x')	✓	✓	✓	✓
1 (x)	✓	✓	✓	✓

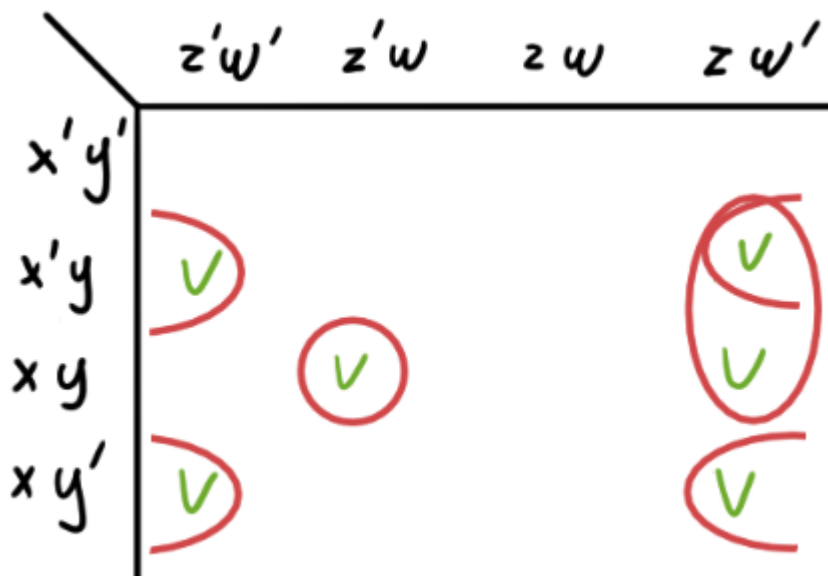
Existe apenas **uma** forma disjuntiva mínima possível:

$$\gamma(x, y, z, w) = 1$$

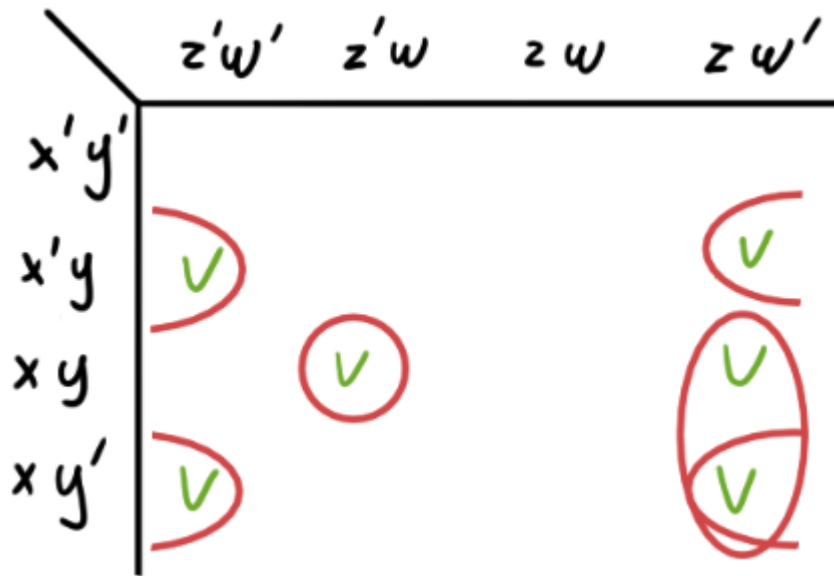
$$d. \delta = \sum m(4, 6, 8, 10, 13, 14) = 0100, 0110, 1000, 1010, 1101, 1110$$

\	00 (z'w')	01 (z'w)	11 (zw)	10 (zw')
00 (x'y')				
01 (x'y)	✓			✓
11 (xy)		✓		✓
10 (x'y)	✓			✓

Existem **duas** formas disjuntivas mínimas possíveis:



$$\delta(x, y, z, w) = xyz'w + xy'w' + x'yw' + yzw'$$

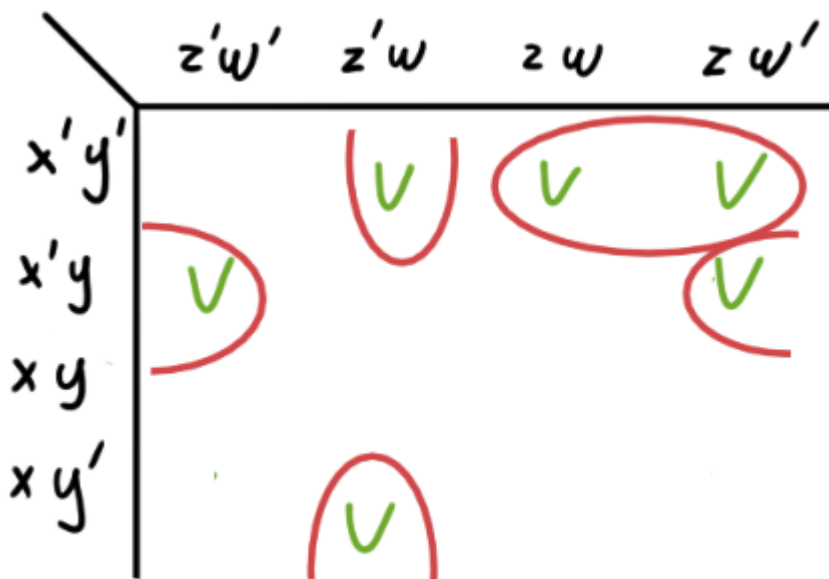


$$\delta(x, y, z, w) = xyz'w + xy'w' + x'yw' + xzw'$$

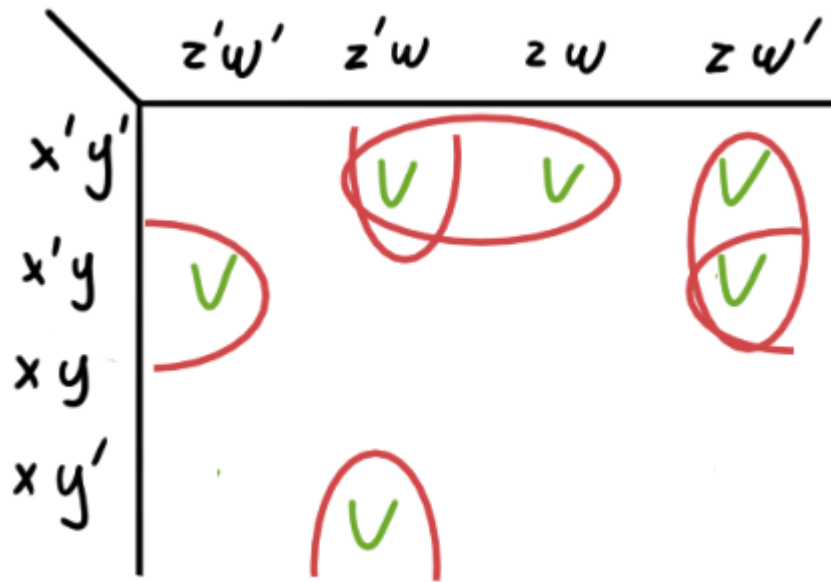
$$e. \eta = \sum m(1, 2, 3, 4, 6, 9) = 0001, 0010, 0011, 0100, 0110, 1001$$

\backslash	00 ($z'w'$)	01 ($z'w$)	11 (zw)	10 (zw')
00 ($x'y'$)		✓	✓	✓
01 ($x'y$)	✓			✓
11 (xy)				
10 (xy')		✓		

Existem **duas** formas disjuntivas mínimas possíveis:



$$\eta(x, y, z, w) = x'yw' + x'y'z + y'z'w$$



$$\eta(x, y, z, w) = x'yw' + x'y'w + x'zw' + y'z'w$$

$$f. \mu = \sum m(0, 1, 2, 4, 8) = 0000, 0001, 0010, 0100, 1000$$

\	00 (z'w')	01 (z'w)	11 (zw)	10 (zw')
00 (x'y')	✓	✓		✓
01 (x'y)	✓			
11 (xy)				
10 (xy')	✓			

Existe apenas **uma** forma disjuntiva mínima possível:

$$\mu(x, y, z, w) = y'z'w' + x'y'w' + x'y'z' + x'z'w'$$

4.

a. $ab' + c$

b. $ab + b'c' + a'b'$

c. $bc + a'b + ab'$

d. $a' + c$

5.

a. $a'c + abc + ac'd' + a'b'$

b. $a'cd + b'cd' + ab'd' + abc'd$

c. $a'c + a'd' + cd' + ab'c'$

d. $bc + ab' + b'c'$
