Laborator Proiectare Logică 6

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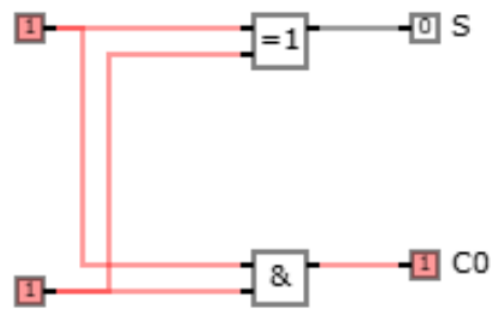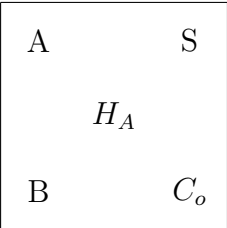
Half Adder

$S = \sum(1,2) = \bar{A}B + A\bar{B}$
$S = \Pi(0,3) = (A + B)(\bar{A} + \bar{B})$
$S = A \bigoplus B$
$C_o = \sum(3) = AB$
$C_o = \Pi(0,1,2) = (A + B)(A + \bar{B})(\bar{A} + B)$

A	B	S	C_o
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

S

	0	1
0	0	1
1	1	0

C_o

	0	1
0	0	0
1	0	1

Full Adder

$S = \sum(1,2,4,7) = \bar{A}\bar{B}C_i + \bar{A}B\bar{C}_i + \bar{A}\bar{B}\bar{C}_i + A\bar{B}\bar{C}_i + ABC_i$
$S = \Pi(0,3,5,6)$
$= (A + \bar{B} + C_i)(A + \bar{B} + C_i)(\bar{A} + B + \bar{C}_i)(\bar{A} + \bar{B} + C_i)$
$S = \bar{C}_i(\bar{A}B + A\bar{B}) + C_i(\bar{A}\bar{B} + AB)$
$A \bigoplus B = \bar{A}B + A\bar{B}$
$A \bigoplus B = \bar{A}\bar{B} + AB$
$S = A \bigoplus B \bigoplus C$

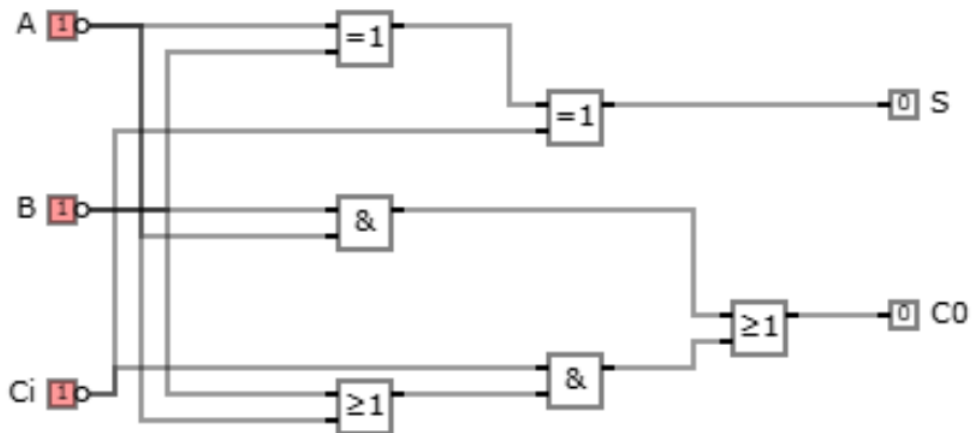| A	B	C_i	S	C_o
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

$C_o = \sum(3,5,6,7) = \bar{A}BC_i + A\bar{B}C_i + AB\bar{C}_i + ABC_i$
$C_o = \Pi(0,1,2,4) = (A + B + C_i)(A + B + \bar{C}_i)(A + \bar{B} + C_i)(\bar{A} + B + C_i)$
$C_o = AB + BC_i + AC_i$
$C_o = AB + C_i(A + B)$

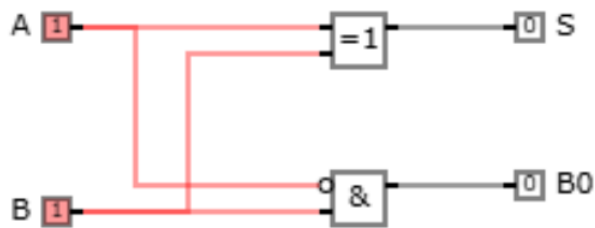# Half Subtractor

$D = \sum(1,2) = \bar{A}B + A\bar{B} = A \bigoplus B$
$D = \Pi(0,3) = (A + B)(\bar{A} + \bar{B}) = A \bigoplus B$
$B_o = \sum(1) = \bar{A}B$
$B_o = \Pi(0,2,3)$
$B_o = (A + B)(\bar{A} + B)(\bar{A} + \bar{B}) = \bar{A}B$

A	B	D	B_o
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

Full Subtractor

$D = \sum(1, 2, 4, 7) = A \bigoplus B \bigoplus B_i$

$D = \Pi(0, 3, 5, 6) = A \bigoplus B \bigoplus B_i$

$B_o = \sum(1, 2, 3, 7)$

$B_o = \bar{A}\bar{B}B_i + \bar{A}B\bar{B}_i + \bar{A}BB_i + ABB_i$

$B_o = \Pi(0, 4, 5, 6)$

$B_o = (A + B + B_i)(\bar{A} + B + B_i)(\bar{A} + B + \bar{B}_i)(\bar{A} + \bar{B} + B_i)$

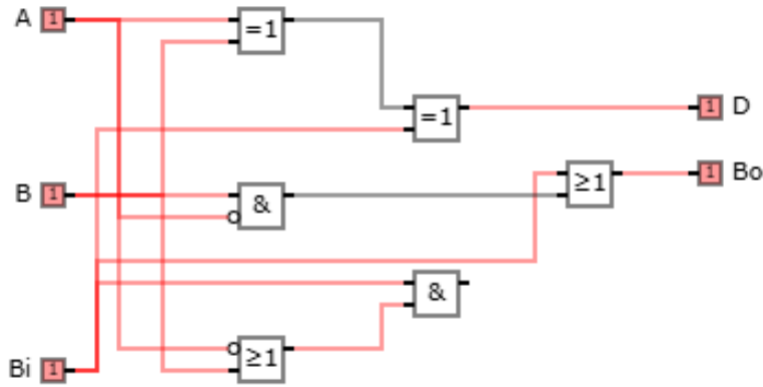| A	B	B_i	D	B_o
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

B_o

B_i \ AB	00	01	11	10
0	0	1	0	0
1	1	1	1	0

$B_o = \bar{A}B + \bar{A}B_i + BB_i$

$B_o = \bar{A}B + B_i(\bar{A} + B)$