$A + BC = (A+B)(A+C)$

S_2	S_1	S_0	Operation
0	0	0	DEC A
0	0	1	SBB
X	1	0	OR
1	0	0	Transfer A
1	0	1	SUB
X	1	1	AND

$X_i \oplus Y_i \oplus Z_i$

C_{in}			Y_i	C_{in}	
0	0	0	1	0	DEC
0	0	1	$\bar{B}$	0	SBB
1	0	0	1	1	Trans.
1	0	1	$\bar{B}$	1	SUB

arithmetic

logical

logical Arith.

$$Z_i = S_1\bar{S_0} + \bar{S_1} C_i$$

$$C_{in} = \bar{S_1} S_2 + S_1 \bar{S_0}$$

$$Y_i = \bar{S_1}\bar{S_0} + \bar{S_1} S_0 \bar{B} = \bar{S_1}(\bar{S_0} + S_0\bar{B})$$

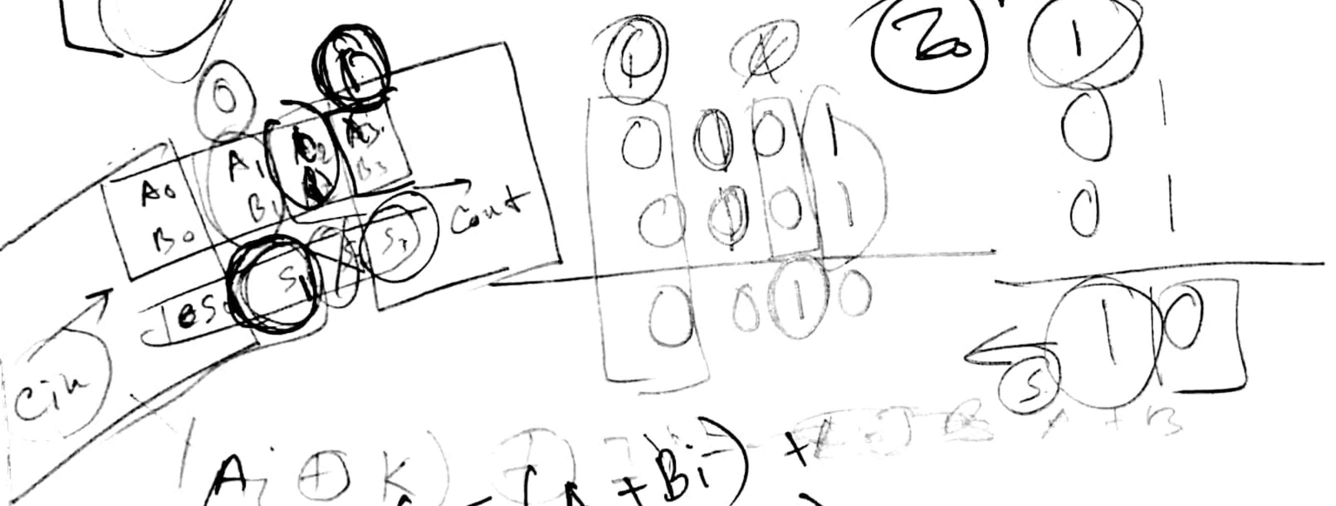
$$= \cancel{S_1}(\cancel{\bar{S_0} + S_0})(\bar{S_0} + \bar{B}) = \bar{S_1}(\bar{S_0} + \bar{B})$$

$X_i \oplus Y_i \oplus t_i$

S_2	S_1	S_0	X_i	Z_i	Y_i	C_{in}	Operation
0	1	0	A_i+B_i	1	1	1	OR
0	1	1	A_i+B_i'	0	$\bar{B}$	0	AND
1	1	0	A_i+B_i	1	1	1	OR
1	1	1	A_i+B_i'	0	$\bar{B}$	0	AND

$X_i = A_i + S_1(B_i \oplus S_0)$ $\quad Y_i = \bar{S_0} + \bar{B_i}$

$Z_i = S_1\bar{S_0} + \bar{S_1}C_i$ $\quad C_{in} = \bar{S_1}S_2 + S_1\bar{S_0}$



$(A_i \oplus K)$ $\bar{S_0}(A+\bar{B_i}) +$

$\bar{S_1}A_i + S_1(\bar{S_0}(A+B_i'))$ $\quad u_i = \bar{A}B$

$A_i \oplus K \quad S_0(A_iK_i + \bar{A}_iK_i)$

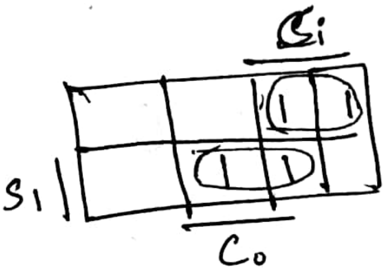
$= B + \bar{A}(A+\bar{B}) = B + \bar{A}\bar{B}$

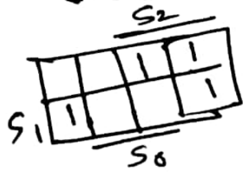
$= (B+\bar{A})(B+\bar{B})$

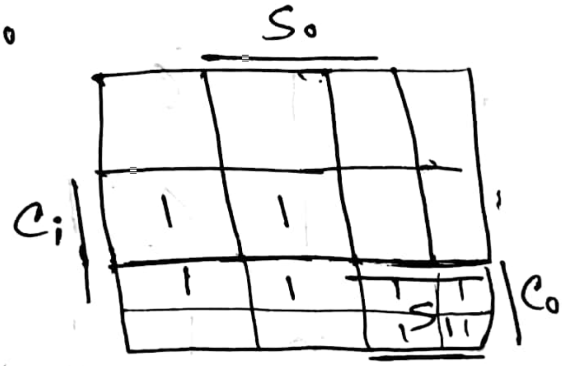
$(A+B_i') \oplus B_i' = (A+B_i').B_i'' + \bar{A}\bar{B_i''}.B_i'$

$= A_iB_i \quad\quad 0$

	C_s1	C_s0	$\boxed{C_{in} \; C_{s2}}$	X_i	Y_i	C_{in} Z_i	$F(x_i \oplus y_i \oplus z_i)$
DEC	0	0	0		1	0	
SBB	0	0	1		$\overline{B_i}$	0	
OR	0	1	0		1 ~~0~~	1 ~~0~~	
~~MOV~~	0	1	1		$\overline{B_i}$	1	
$\overline{\text{OR}}$	1	0	0			C_0	
$\overline{\text{AND}}$	1	0	1	S_1 $\boxed{S_0 B_i}$			
	1	1	0				
NAND	1	1	1				







$$Y_i = \overline{S_0} + \overline{B_i} \quad \overline{S_0 \cdot B_i}$$

$$C_i = \overline{S_1} S_2 + S_1 \overline{S_0}$$

$$X_i = A_i + S_1 (B_i \oplus S_0) \quad 4x$$

$$Z_i = \overline{S_1} C_i + \boxed{S_1 C_0} \quad S_1 \overline{S_0}$$

S_0, S_1, S_2 $\xrightarrow{\text{NOT}}$ $\overline{S_0}, \overline{S_1}, \overline{S_2}, \overline{A_i}, \overline{B_i}$

A_i, B_i

x4 - XOR

AND: $\overline{S_1} S_2$, $S_1 \overline{S_0}$, $S_1 \cdot [B_i \oplus S_0]$ x4, $\overline{S_1} C_i$,

OR: $\overline{S_0} + \overline{B_i}$, $A_i + \square$ x4, $\overline{S_1} S_2 + S_1 \overline{S_0}$, $\overline{S_1} C_i + S_1 \overline{S_0}$ x4

$$ZF : \overline{F_0} \cdot \overline{F_1} \cdot \overline{F_2} \cdot \overline{F_3} = \overline{(F_0 + F_1) + (F_2 + F_3)} = \overline{(F_0 + F_1)} \cdot \overline{(F_2 + F_3)}$$

OR → 3

NOT → 1

$$CF : \overline{S_1} \cdot C_{4out}$$

$$OF : \overline{S_1} (C_{4out} \oplus C_3)$$