HW #5

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3210

1. A = 1100
   B = 0101 $\overline{B}$ = 1011

S_1 S_0 C_{in}	D_3 D_2 D_1 D_0	C_{out}
1 1 1	1 1 0 0	0
1 1 0	1 0 1 1	0
1 0 1	1 1 0 1	0
1 0 0	1 1 0 0	0
0 1 1	1 0 0 0	0
0 1 0	0 1 1 0	0
0 0 1	0 1 0 1	1
0 0 0		

select B & $\overline{B}$, D = A

select B & $\overline{B}$, D = A + 1

no selection, 0000 input

no selection → 0000 input

select $\overline{B}$, add 1

select B, add 1

select B

1100 + 0101 = 10101

0101 + 1 = 0110

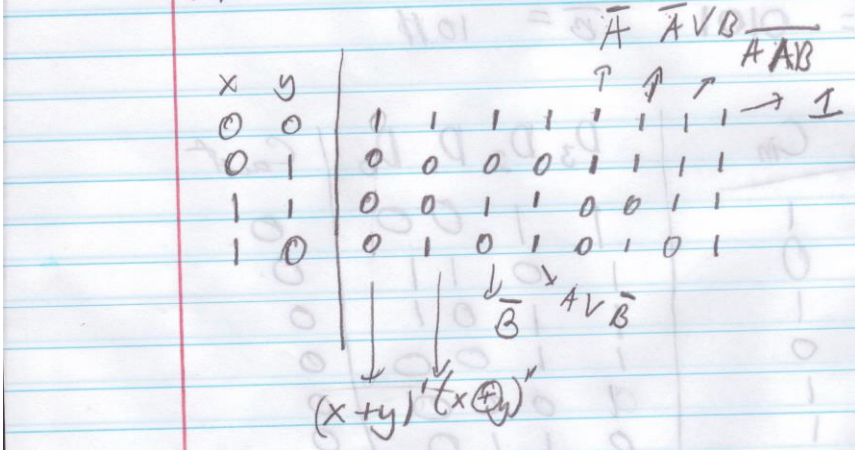
1111 + 1 = 10000

1100 + 1011 = 10111 − 00 = −1

As the circuit is the ALSU, the S_1 S_0 inputs indicate which input of B is to be inserted & the C_{in} controls the carry-in of the functions, which tells if there was a carry in the function before that we need to add in.

All of these functions are additions except when we select B & $\overline{B}$ with no carry in. Then, the function is simply A − 1, Cout determines if there is a extra 1 in the output of the function. This is only true when we add A+B without a carry.

2.



Each operation is simply the reverse of the first 8 operations due to the 1 as MSB.

We look at x & y for each of the functions and try to figure out what operation is being made on x & y.