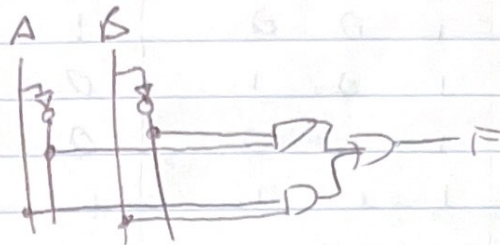


1)

A	B	F
0	0	1
0	1	0
1	0	0
1	1	1

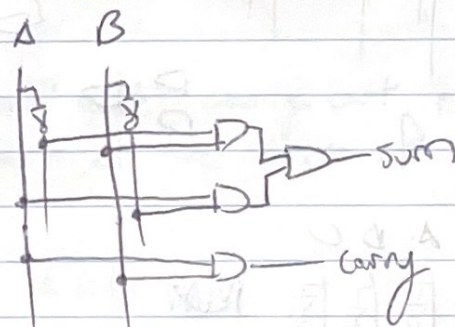
$$\bar{A}\bar{B} + AB$$



2)

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

$$\begin{array}{l} \text{Sum} \\ \bar{A}B + A\bar{B} \quad A \oplus B \\ \hline \text{Carry} \\ AB \end{array}$$



3)

A	B	Cin	Sum	Carry
0	0			
0	1			
1	0			
1	1			

3)

A	B	Cin	Sum	Carry
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

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

		Sum			
		$\bar{B}\bar{C}$	$\bar{B}C$	BC	BC
\bar{A}	$\bar{B}\bar{C}$	0	1	0	1
	$\bar{B}C$	1	0	1	0

$A\bar{B}\bar{C} + \bar{A}\bar{B}C + ABC + \bar{A}BC$

		Carry			
		$\bar{B}\bar{C}$	$\bar{B}C$	BC	BC
\bar{A}	$\bar{B}\bar{C}$	0	0	1	0
	$\bar{B}C$	0	1	1	1

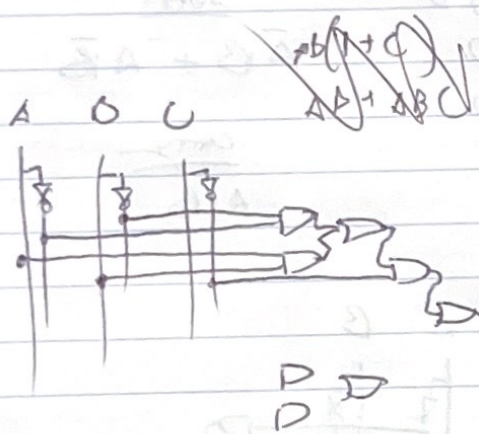
$$AC + AB + BC$$

$$\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + ABC + \bar{A}BC$$

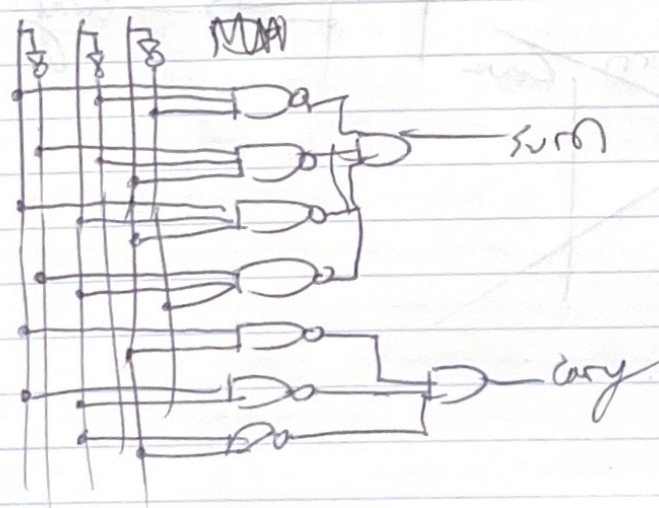
Sum $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + ABC + \bar{A}BC$

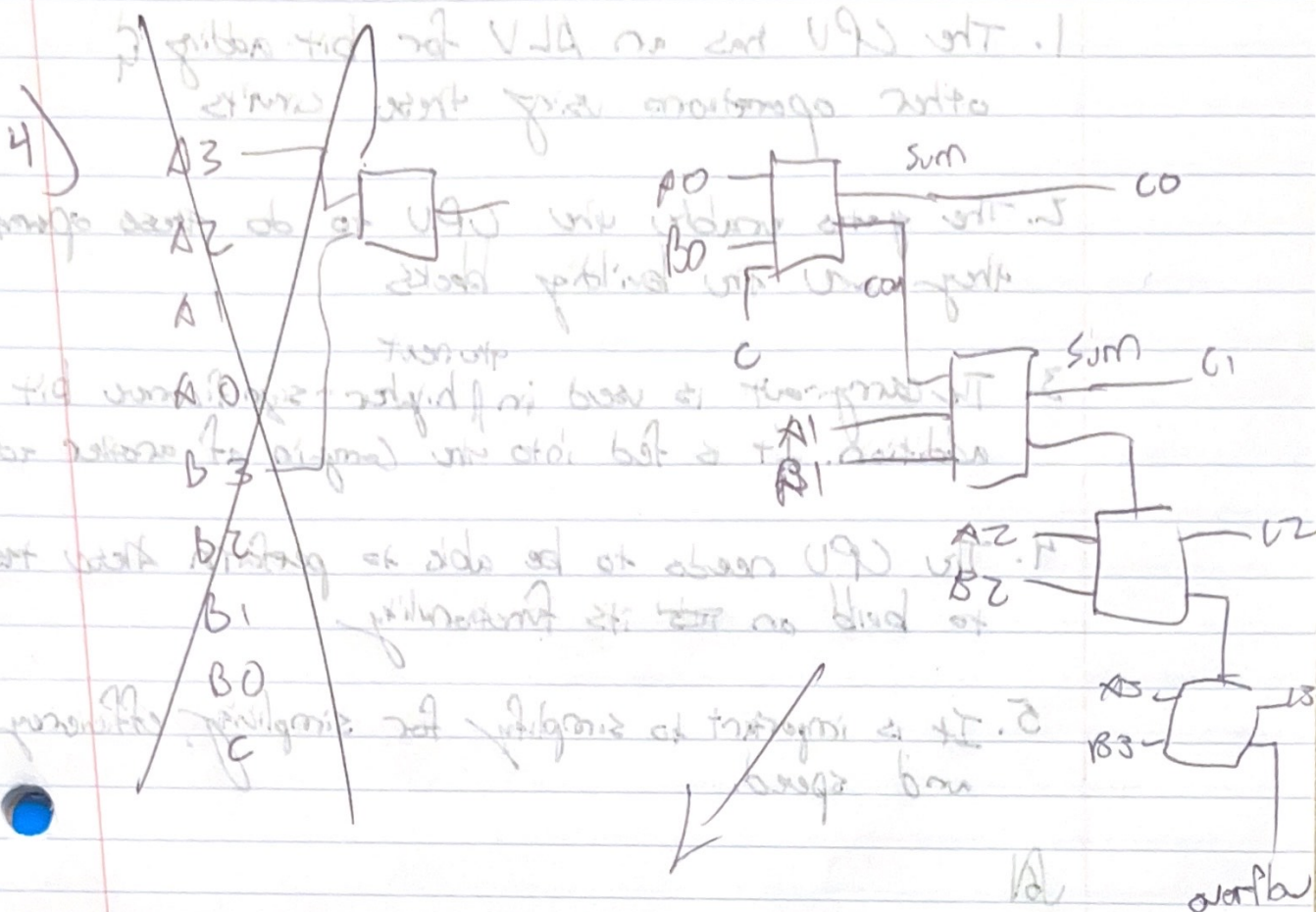
Carry $\bar{A}C + AB + BC$

$$\bar{A}C + AB + BC$$

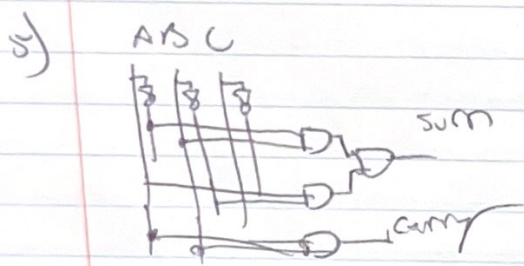


A B C

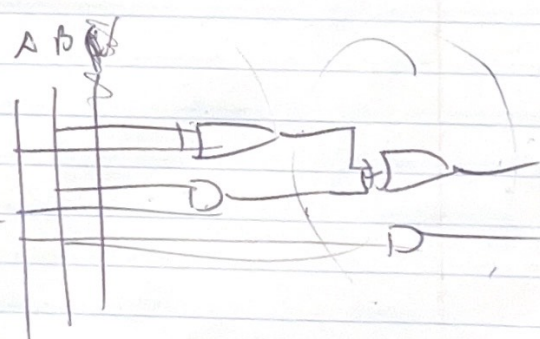
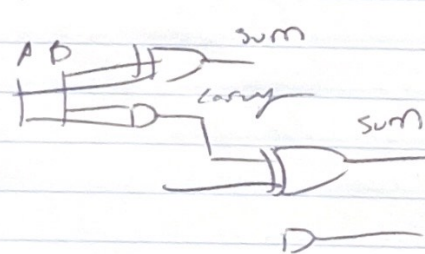




0 0 0 0 1 0
1 1 0 1 1 0



Half adder carry out becomes part of the sum of next Half adder



$$C(A \oplus B)$$

1. The CPU has an ALU for bit adding & other operations using these units
2. The gates enable the CPU to do these operations, they are the building blocks
3. The carryout is used in ^{the next} higher-significance bit addition. It is fed into the carryin of another adder
4. The CPU needs to be able to perform these tasks to build on ~~its~~ its functionality
5. It is important to simplify for simplicity, efficiency, and speed.

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