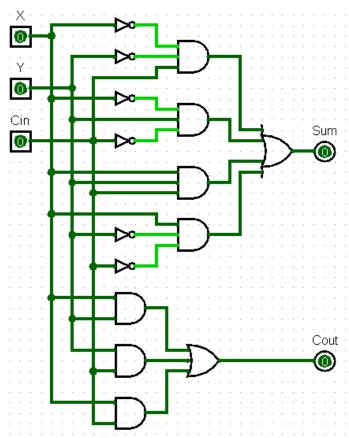Alenn Wright
Project 1
9/9/21

3 Bit Adder

Overview

In this project we are tasked to get familiar with logisim. After this we are to work out the logic and K-maps for a 1 bit and 3 bit full adder. Once we have a minimized version of the full adder logic we will build it in Logisim and simulate it.
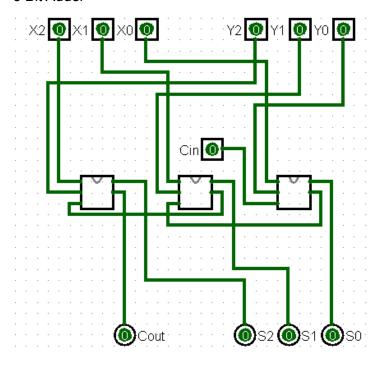
K maps and truth tables

$Sum(X, Y, Cin)$

X Y Cin	
0 0 0	0
0 0 1	1
0 1 0	1
0 1 1	0
1 0 0	1
1 0 1	0
1 1 0	0
1 1 1	1

$Cout(X, Y, Cin)$

X Y Cin	
0 0 0	0
0 0 1	0
0 1 0	0
0 1 1	1
1 0 0	0
1 0 1	1
1 1 0	1
1 1 1	1

$$Sum = \overline{X}\,\overline{Y}\,Cin + \overline{X}\,Y\,\overline{Cin} + X\,\overline{Y}\,\overline{Cin} + X\,Y\,Cin$$

$$= X(\overline{Y}\,Cin + Y\,\overline{Cin}) + X(Y\,Cin + \overline{Y}\,\overline{Cin})$$

$$Cout = XY + Y\,Cin + X\,Cin$$

1 Bit Adder

X

Y

Cin

Sum

Cout

3 Bit Adder

X2   X1   X0   Y2   Y1   Y0

Cin

Cout   S2   S1   S0

Conclusion

      I think this project was interesting as I have never used Logisim before so I found it very cool. The project was easy, but this is partially because I have already finished my EE part of my degree so digital logic is very easy. I would like to play with logisim some more and would be curious how well making an alu on here would work then work up to a computer.