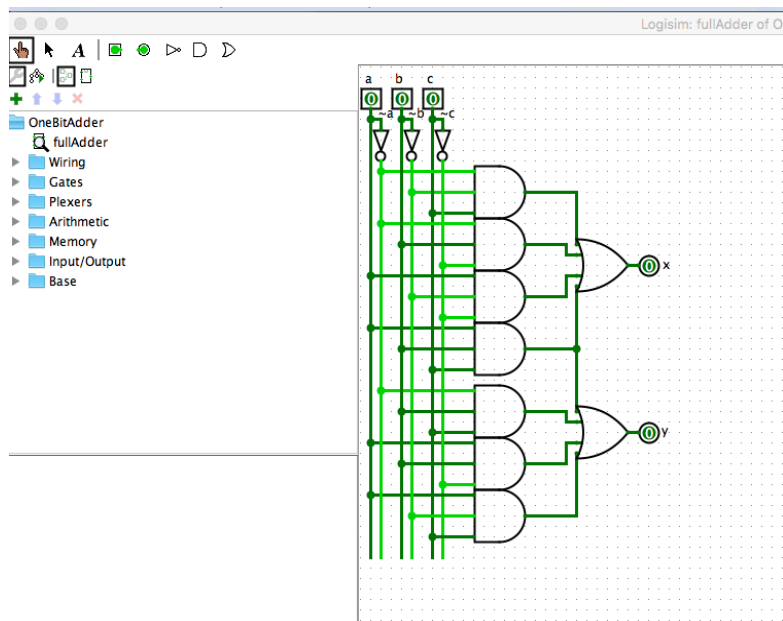
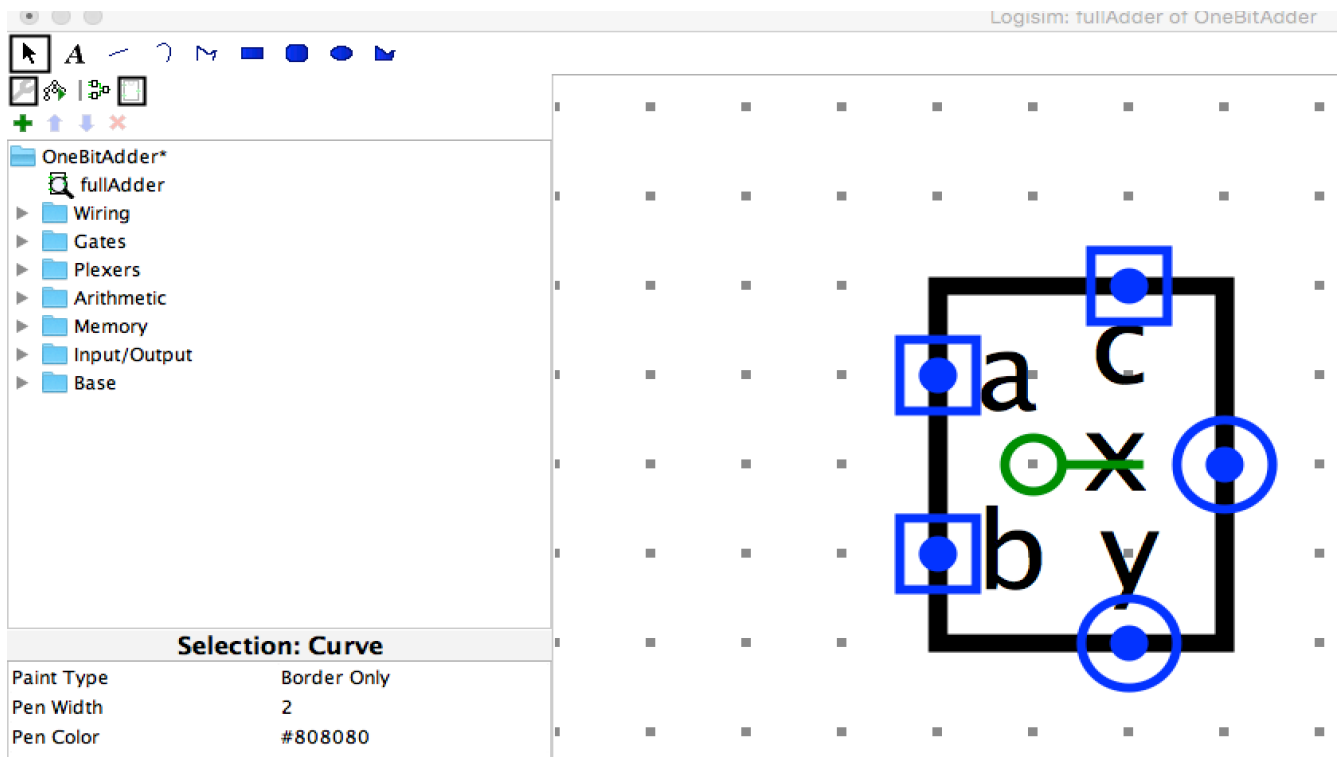


ASDV 1205 - Intro to IT
Lab Adder-Subtractor

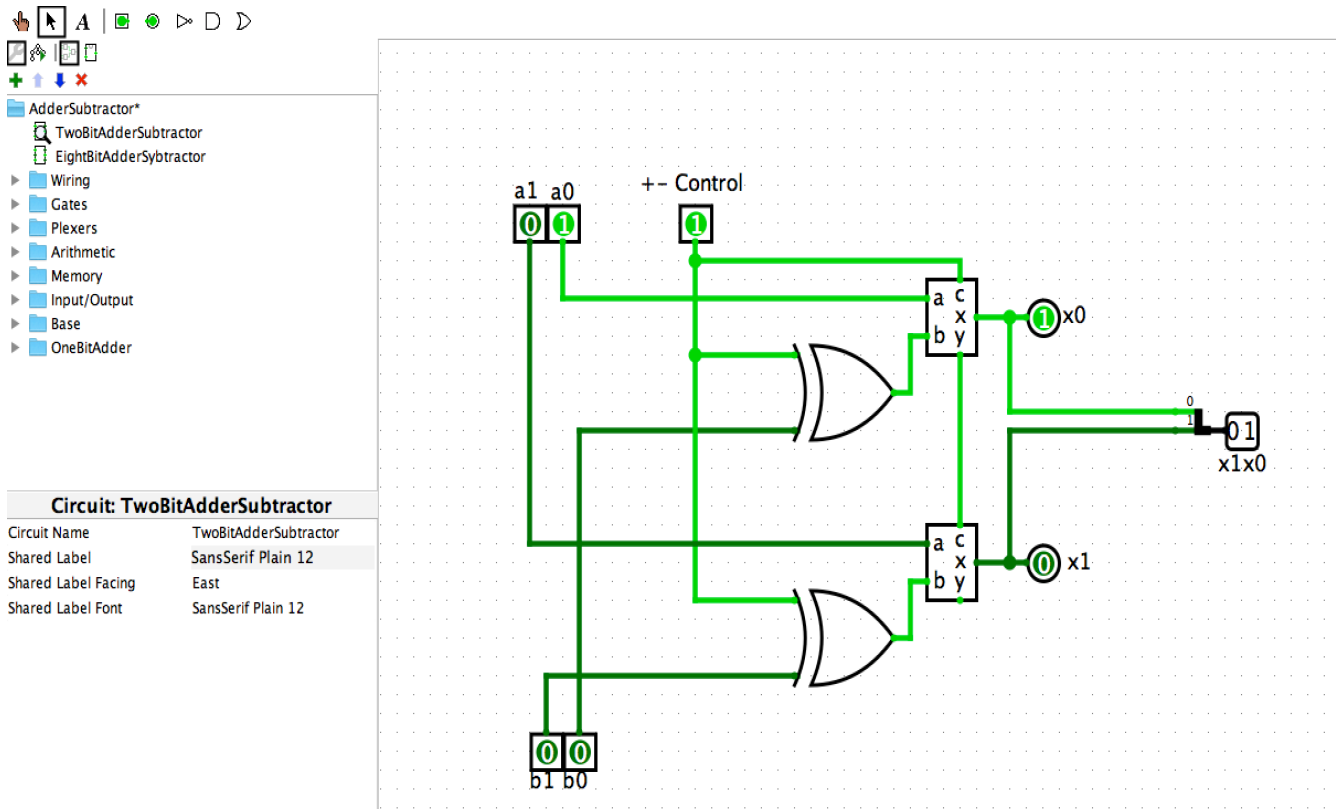
1. Open your full adder circuit and Save AS twoBitAdder.



2. Edit its chip as shown below: a is one input (used to be x), b is the other input (used to be y), c input is the carry in, y output is the carry out, x output is the sum. Make the chip 4 pixels width and 5 pixels height as shown below.



3. Create a new Circuit (File > New), Save As AdderSubtractor. Rename its main to **TwoBitAdderSubtractor**, Load the Library OneBitAdder. Put the fullAdder (OneBitAdder) in the bread-box.
4. With the full adder chip in the bread-box, build a 1-bit Adder Subtractor as shown below.
 Explanation of the circuit: The XOR gate takes the 1's complement of bit **b** when the +- input bit is set to 1. Why the XOR does the 1's complement when +- is 1? 1 XOR 0 gives you 1, and 1 XOR 1 gives you 0. That is the 1 XOR anything, reverses the anything, which is the 1's complement of the anything. When the +- is 0, the XOR leaves the bit b unchanged. Then, the +- input bit adds 1 to 1's complement when the +- bit is 1, and this is the 2's complement of bit b. So we make bit **b** a negative number (2's complement) when the bit +- is set to 1.



- Right click on the AdderSubtrator Folder at the upper left. Select Add Circuit. When a dialog pops up to type the name of the circuit, type EightBitAdder.
- Replicate the fullAdder, and the XOR gate as shown below. Add the splitters shown.
- Test your circuit for both addition and subtraction.
- Test and upload the following jpg:

a	+ - control	b	result	jpg to upload
0,0000000	-	0,0000001	1,1111111 $(-1)_{10}$	zero-one.jpg
0,0000001	+	0,0000000	0,0000001 $(1)_{10}$	one+zero.jpg
0,0000001	-	0,0000001	0,0000000 $(0)_{10}$	one-one.jpg
0,0001010	-	0,0000111	0,0000011 $(3)_{10}$	ten-seven.jpg
0,0010000	-	0,0010010	1,1111110 $(-2)_{10}$	A16-18.jpg

