

Four Bit Adder Activity

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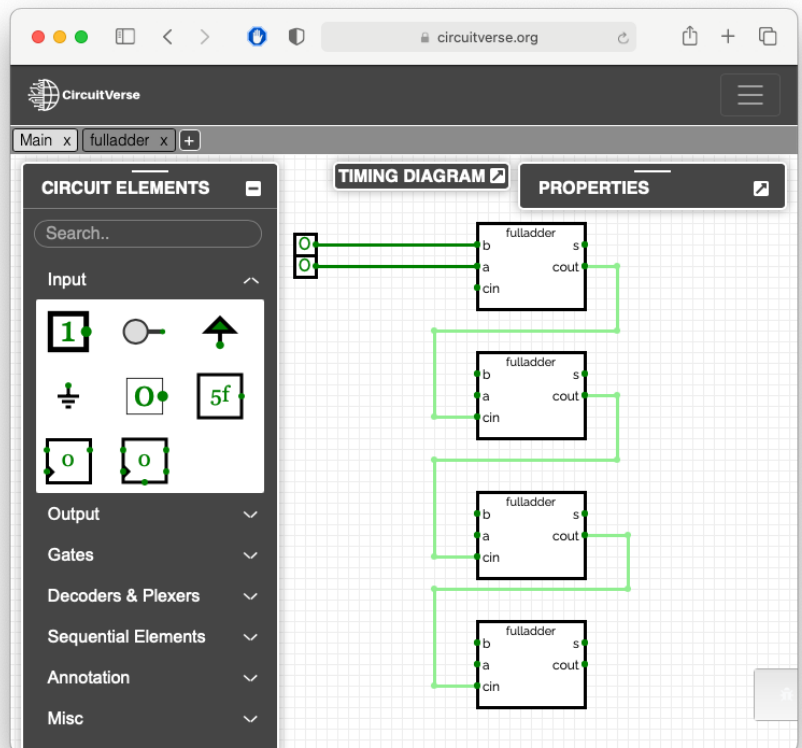
Name:

1. Navigate to <https://circuitverse.org/simulator> and load your project from the last lab by clicking Project → Open Offline.
2. Next you're going to create a subcircuit of your full adder, which is a black box that contains all the logic. Highlight all of your gates of your full adder (CTRL+A or CMD+A on Mac) and copy to clipboard (CTRL+C or CMD+C on Mac). Then click Circuit → New Circuit and name your new circuit "fulladder." This will create a new empty schematic. Paste the logic (CTRL+V or CMD+V) in there. In your subcircuit, give your inputs names (a, b, cin, s, and cout) in the properties panel on the right side of the screen.

Building a 4-bit Ripple Carry Adder:

Return to the Main circuit by clicking "Main" on the top gray bar. Instantiate your fulladder design four times by clicking Circuit → Insert Subcircuit and select fulladder. Daisy chain your full adders together to make a four bit adder as in the diagram to the right. Connect the first carry in to 0 (ConstantVal in the Input panel). Then connect the carry out of the first adder to the carry in of the next. Connect the S_{out} signals to LEDs. Connect inputs a and b to on each full adder to binary inputs from the Input panel.

Once this is working, flag Neil down and demo it. Screenshot your adder circuit and save it.



3. If the propagation delay through each gate is 10 ms, what is the overall delay through this 4-bit adder circuit? How does the delay scale as we increase the number of bits in the adder?