Half Adder Activity

Date: January 26, 2021

Name:

1. Fill out the truth table for the half adder.
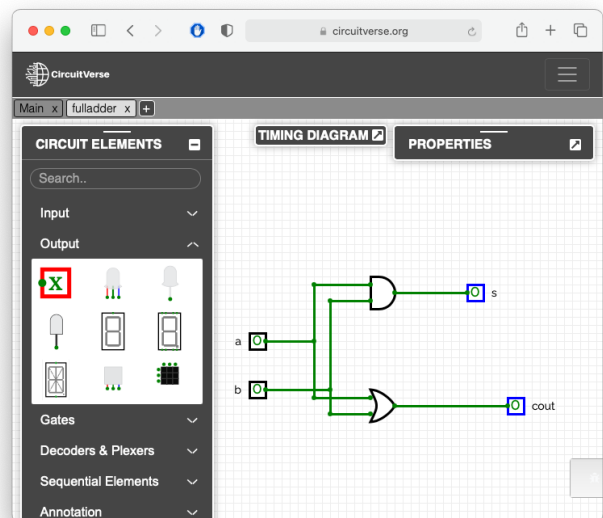
A_{in}	B_{in}	C_{in}	C_{out}	S_{out}	Sum (Decimal)
0	0	0	0	0	0
0	0	1	0	1	1
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

2. Write a boolean logic expression for the following:

$$C_{out} =$$

$$S_{out} =$$

3. Navigate to https://circuitverse.org/simulator and implement your logic expression with gates. Switches are inputs, and light bulbs are outputs. An example of switches connected hrough an AND and OR gate is below. You can place logic gates by clicking and dragging from the menu items on the left side of the screen onto the schematic. You can place Inputs and Outputs from the Input and Output dropdown menus on the left side.

Input Panel	Description
Input	Binary input that can be set as `0` or `1`. Can serve as an input to submodules.
Button	Binary input that you can interact with by clicking. Can't be input to submodules.
Power/Ground	Hard-wire to `1` (Power) or `0` (Ground).
ConstantVal	Similar to Power/Ground, allows you to hard-wire signals to `0` or `1`.

Output Panel	
Output	Reads the value of a wire in your design as a `0` or `1`. Can serve as an output of submodules.
DigitalLED	Monitor for a binary signal in the design. Turns red when the signal is `1`.
HexDisplay	Used for displaying multi-bit numbers. Has a 4-bit input that is displayed as a hexidecimal character.

Misc	
Splitter	Allows you to combine several single-bit signals into a mulit-bit bus that represents a single number. To make a splitter, you need to type in (1) the bit width of the multi-bit bus and (2) the input width of each smaller signal. For example, say you want to combine four 1-bit signals into one 4-bit signal. `bitWidth` would be 4 and `bitWidth Split` would be `1 1 1 1` (four ones separated by spaces).

4. When you're finished implementing your half-adder, flag down Neil and demonstrate it. Click Project ¿ Save Offline to store your project. You'll need it for the next lab.

5. If each gate adds 10ms of delay from input to output, what is the total propogation delay through the circuit? What is the critical path?