CprE 381 – Computer Organization and Assembly-Level Programming

Lab-02 Report

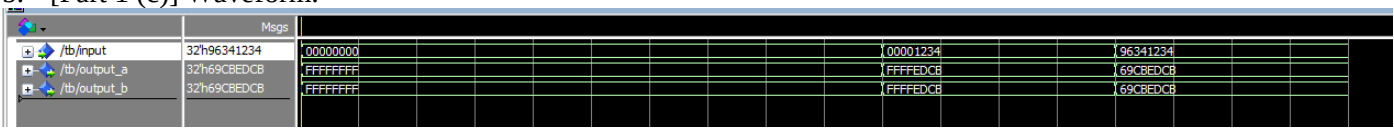
Student Name ____Ben Pierre_____

Section / Lab Time ____10___

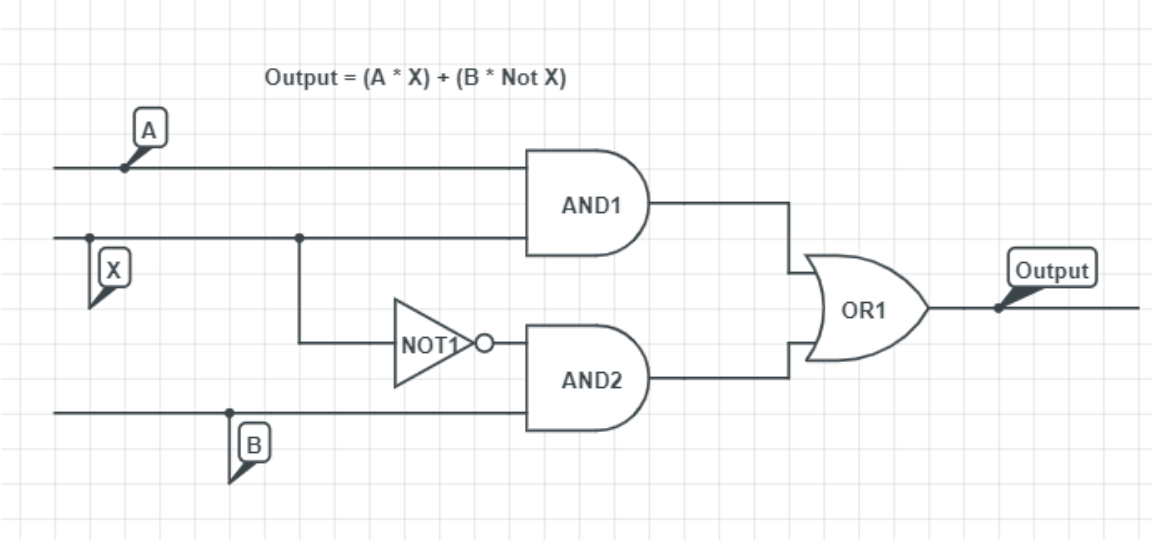
Submit a typeset pdf version of this on Canvas by the due date (i.e., the start of your next lab section). Refer to the highlighted language in the Lab-02 instructions for the context of the following questions.

a. [Prelab] At the end of Chapter 3, answer questions 4b), 5a), and 6.

b. [Part 1 (c)] Waveform.

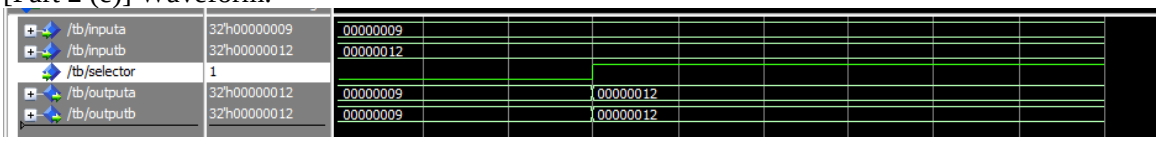


c. [Part 2 (a)] Draw the truth table, Boolean equation, and Boolean circuit equivalent (using only two-input gates) that implements a 2:1 mux.



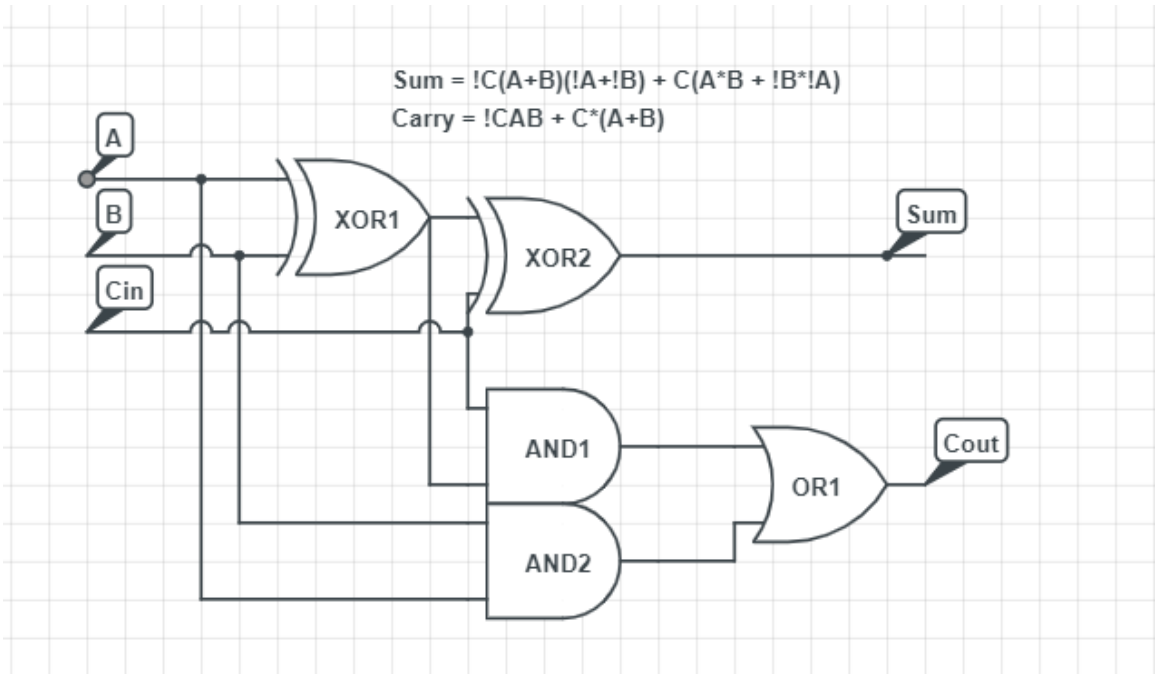
A	B	X	Output	
0	0	0	0	
0	1	0	0	
1	0	1	1	
1	1	1	1	

d. [Part 2 (e)] Waveform.

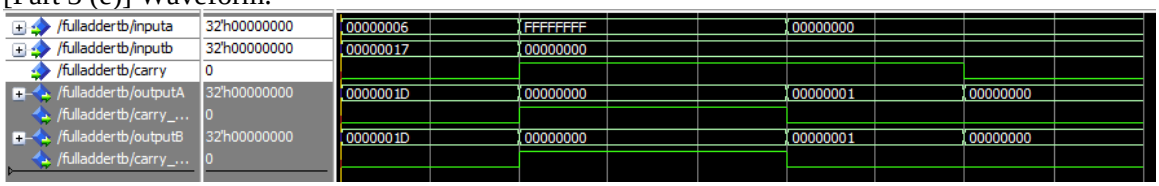


e. [Part 3 (a)] Draw the truth table, Boolean equation, and Boolean circuit equivalent (using only two-input gates) that implements a full adder.

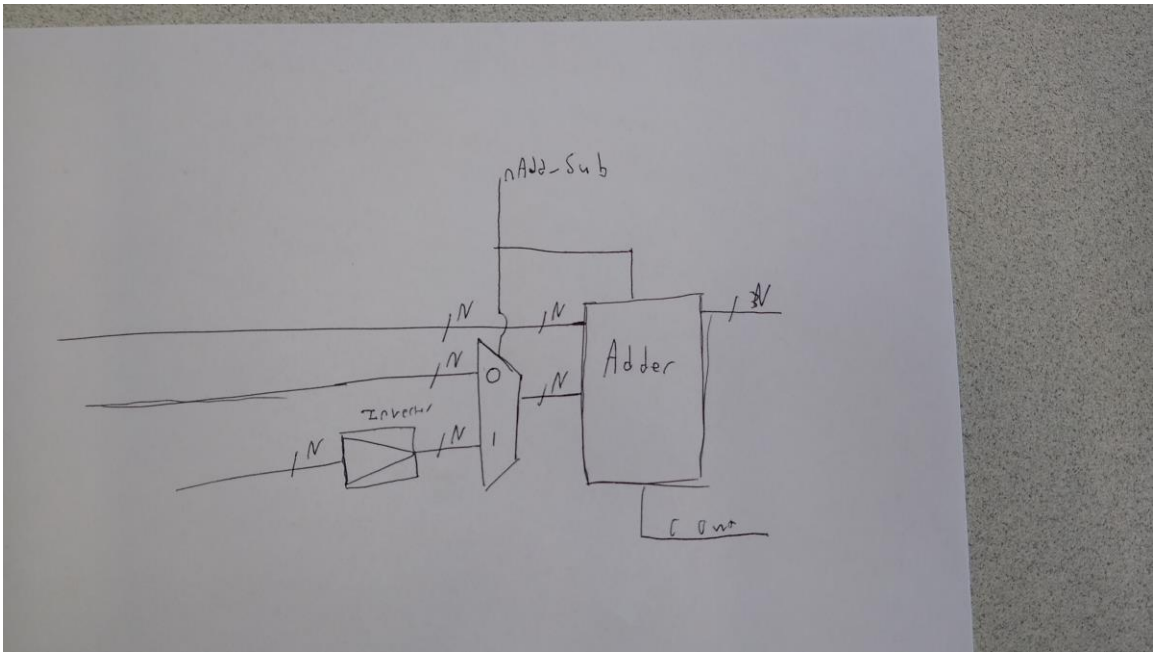
A	B	Cin	Sum	C out
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1



f. [Part 3 (e)] Waveform.



g. [Part 4 (a)] Draw a schematic (don't use a schematic capture tool) showing how an N-bit adder/subtractor with control can be implemented using only the three main components

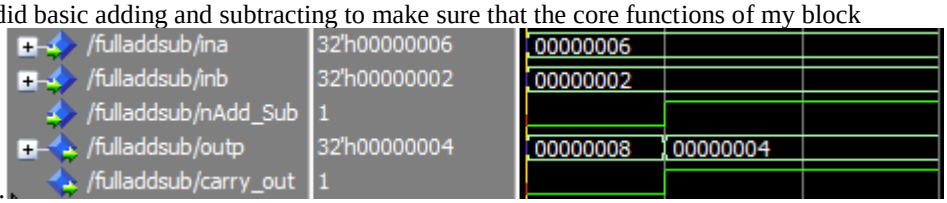


designed in problems 1), 2), and 3) (the N-bit inverter, N-bit 2:1 mux, and N-bit adder). How is the 'nAdd_Sub' bit used?

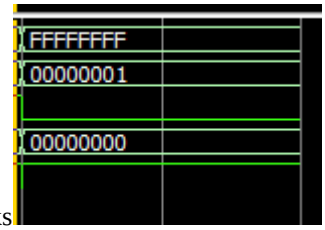
That bit is used to control both the multiplexer and as the carry bit to the adder

h. [Part 4 (c)] Provide multiple waveform screenshots in your write-up to confirm that this component is working correctly. What test-cases did you include and why?

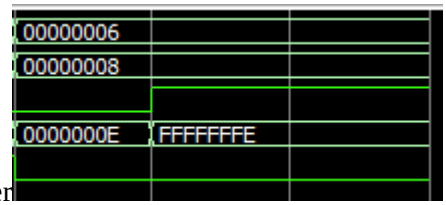
Here I did basic adding and subtracting to make sure that the core functions of my block worked.



Here I added one to FFFFFFFF to make sure that the carry works



Here I subtracted 8 from 6 to ensure that I do get a negative number



i. [Feedback] You must complete this section for your lab to be graded. Write down the first response you think of; I expect it to take roughly 5 minutes (do not take more than 10 minutes).

i. How many hours did you spend on this lab?

Task	During lab time	Outside of lab time
Reading lab	0	0
Pencil/paper design	.5	.5
VHDL design	1	2
Assembly coding	.5	2
Simulation	0	1
Debugging	0	.5
Report writing	0	0
Other:	0	0
Total	2	5

ii. If you could change one thing about the lab experience, what would it be? Why?
    i. I get why we made everything from scratch however everyone I talked to got to around the 2:1 MUX in their lab time, so the two times the document mentioned talking to a TA for details we were unable to due to being outside of a lab section / we would have had to allocate even more time to finding a TA and talking to them

iii. What was the most interesting part of the lab?
    i. I actually enjoyed seeing just how much easier dataflow is verse structural coding.