Homework #3

Homework assigned Tues 22 Nov to be collected on Tues 29 Nov

You are to execute everything stated on the same screen. Do not forget to save your work frequently.

Part 1

Design and implement a 9-bit (8 data bits + sign bit) full adder/subtractor. Start with the 2 bit full adder implemented in NAND gates as worked up in the class and then use copies of the full adder wiring these up in a ripple-carry fashion.

Part 2

Bring in from the LS library the part LS83A which is a 4 bit full adder with carry lookahead. You should have encountered this IC when you engaged the second tutorial for B2Logic for HW assignment #2. Arrange the part so that it can be used to add or subtract signed numbers as you deem necessary.

With the circuits on the screen, connect the inputs to the adder/subtractor you designed in part 1. Connect those same inputs to the circuit you have contrived using the LS83A.

Part 3

Save the circuits and then run them with the following inputs

(i)   Add 127 to 3

(ii)   Subtract 7 from 4

Use the nominal gate delays for the gates during simulation.

The expectation is that you will produce 6 single-page hardcopy printouts as follows. Do not forget to print your name and course section clearly on your homework submissions:

For case (i)
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(a) finished high level schematic for part 3 for case (i)   [26]

(b) timing table for the circuits solving case (i)   [12]

(c) time trace for the circuits solving case (i)   [12]

For case (ii)
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(d) finished high level schematic for part 3 for case (ii)   [26]

(d) timing table for the circuits solving case (ii)   [12]

(e) time trace for the circuits solving case (ii)   [12]

TOTAL POINTS   **[100]**