**UNC Charlotte, Department of Electrical and Computer Engineering**
ECGR 2181, Fall 2009, Homework #9
Due: 11/6/09, at the recitation (100 points)

Show all of your work!!!!! Also, use ONE side of the paper and do not staple.

1. How long did this assignment take you? (Answer truthfully!) (5 points)
2. Consider the simple ALU, below, with the following control listed in the truth table. This is an extension from Homework assignment #8.

op3	op2	op1	op0	S
0	0	0	0	A + B
0	0	0	1	A - B
0	0	1	0	2 * A
0	0	1	1	0
0	1	0	0	A
0	1	0	1	A+1
0	1	1	0	Reserved
0	1	1	1	A-1
1	0	0	0	Max(A,B)
1	0	0	1	Reserved
1	0	1	0	Reserved
1	0	1	1	Reserved
1	1	0	0	Min(A,B)
1	1	0	1	Reserved
1	1	1	0	Reserved
1	1	1	1	Reserved
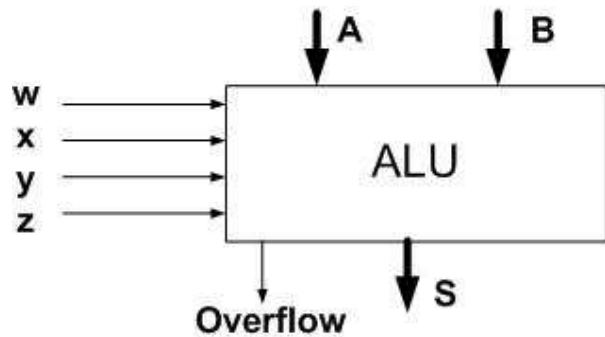
A and B are eight bits wide, S is eight-bits wide. All are twos-complement numbers. Overflow is only needed for addition, subtraction, and "multiply".

Expand the Homework 8 schematic design by adding the three new functions. Be careful - all numbers are two's complement, so $A=11111111_2$ (-1_{10}) is actually LESS THEN $B=00000001_2$ (1_{10}). You should design using eight 1-bit comparators. Hint: The comparator for the highest bit will be different that the comparators for the remaining bits. Show the contents of these two different one-bit comparators (but you do not need the show it seven times - just show the 1-bit comparator box in the largest schematic).