

0306-341 HW #4 Spring 09

Due Date: Wed 04/08/09

(For some questions below, you have answer in your notes and the online handouts. Try to do it all by yourself before looking into these references.)

1. Determine the binary representations of the following decimal numbers in the Sign-Magnitude, Ones' Complement, and Two's Complement systems. Use **8 bits** to represent the numbers.

$78_{(10)}$, $-101_{(10)}$

2. Build a 1-bit full adder that takes input A, B, and CIN, and produces output SUM and COUT. Provide
 - a. The truth table
 - b. The 2-level AND-OR circuit implementation
 - c. The 2-level NAND-NAND circuit implementation
 - d. The 2-level NOR-NOR circuit implementation
3. Build the two different overflow detection circuits for a general adder (assuming Two's Complement binary numbers) discussed in class using AND, OR, and inverters. **(Please come to see me if you are not clear about the two different types of overflow circuits.)**
4. Perform the following arithmetic operations assuming the numbers are Two's Complement binary numbers. Indicate whether the SUM is valid or not (i.e., whether there is an overflow or not). Show how you derive the answers and the arguments to obtain full credits.
 - a. $1011 - 0110$
 - b. $0101 - 1000$