Honors Homework 6:
Circuits

CMSC 250H

Due Date: Monday March 22, 9:00AM, NO DEAD CAT

1. (2 point) Prove using Algebraic Manipulation: $Y + \bar{X}Z + X\bar{Y} = X + Y + Z$.
2. (1 point) Build a Half Adder out of NAND Gates. How many gates does it take? How many gates does it usually take (using fan-in-2 AND, fan-in-2 OR, NOT gates)?
3. (1 point) Build a Full Adder out of NAND Gates. How many gates does it take? How many gates does it usually take (using fan-in-2 AND, fan-in-2 OR, NOT gates)?
4. (2 points) Assume an AND-gate costs x dollars, an OR-Gate costs y dollars, a NOT-gate costs z dollars, and NAND-gate costs w dollars.
   (a) Give an inequality in w, x, y, z such that if it is satisfied then NAND is cheaper to use for a Half Adder then the AND-OR-NOT gates.
   (b) Give an inequality in w, x, y, z such that if it is satisfied then NAND is cheaper to use for a Full Adder then the AND-OR-NOT gates.