# LABORATORY 1 (DUE on 9/11)

Combinational Logic: Simulation and Design

1. Using the logic simulator, embedded in Section 1.7.3 of our interactive book, determine the function f implemented by the circuit in this figure.
    a.   Show the truth table
    b.   Write down the SOP of the function.
    c.   Use Boolean algebraic manipulation to reduce the function to two product terms. Show your work. **(Hint: seek to apply the Uniting theorem: XY + XY' = X)**
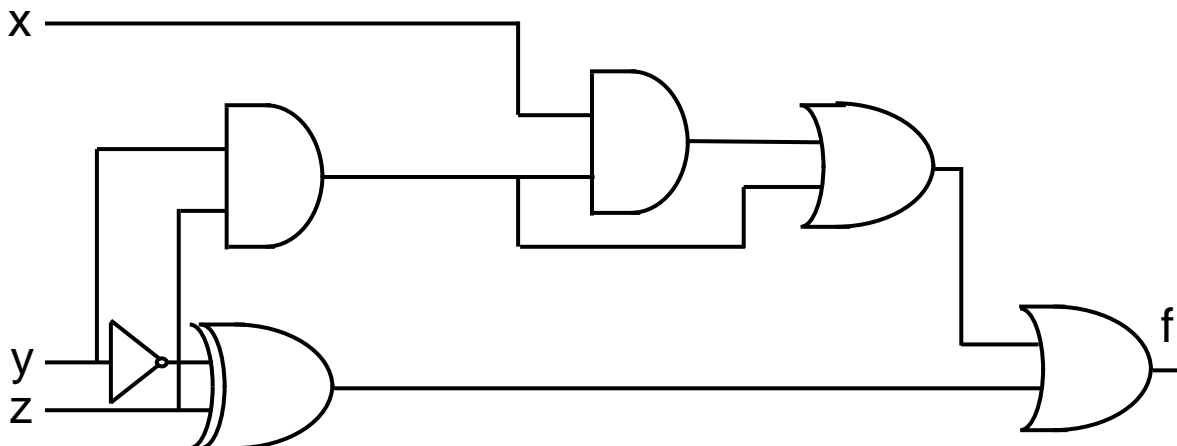
2. Realize the function from part 1c in terms of only the following gates: 2-input OR, AND, NOR, NAND, and INV. (No XORs can be used). *Use as few gates as possible*. (Each inverter is counted as a gate.) **(Hint: seek to apply De Morgan's Laws)**
    a.   Using the simulator, prove the equivalence of your new circuit to the original circuit. Present evidence that supports your argument.

Lab Report Submission is due on Canvas by 8pm on 9/11.

In your lab report, in addition to answering the questions above please include the screen capture of both the original circuit and the circuit you designed in Part 2, as you simulate them in the logic simulator.