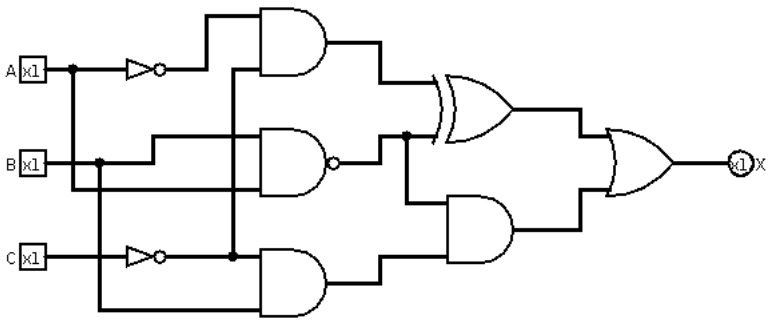
Name: _____

Write all of your responses on the extra paper provided. Hand in this exam paper along with your solutions, please place your name on the top of each page. Show all of your work.

1. (5 Points) Draw a diagram for the von Neumann model of a uniprocessor computer.
2. (5 Points) State Moore's Law and the modified version of Moore's Law.
3. (10 Points) Convert $(12345)_{10}$ to bases, $r = 2$, $r = 5$, $r = 8$, and $r = 16$.
4. (10 Points) Convert $(123.45)_{10}$ to bases, $r = 2$, $r = 3$, $r = 8$, and $r = 16$.
5. (5 Points) Convert the binary number 10010101.00011 to octal and hexadecimal.
6. (5 Points) Convert the hexadecimal number FA57.D3 to binary and octal.
7. (10 Points) Take the two binary numbers $a = 100100110$ and $b = 1101100011$ and calculate $a + b$, $b - a$, and $a \cdot b$, using binary arithmetic.
8. (5 Points) Find the 1's and 2's complement of 123, using byte storage with one sign bit.
9. (5 Points) Convert 57 to binary and then using the 2's complement of 123 and addition, calculate $57 - 123$ in binary form.
10. (50 Points) Do the following for the circuit below.



   (a) Construct the truth table for the circuit.
   (b) Write the circuit's logical function in canonical SOP form.
   (c) Write the circuit's logical function in canonical POS form.
   (d) Write the circuit in minterm form.
   (e) Write the circuit in maxterm form.
   (f) Write the K-Map for the circuit, show the groupings you would use, and then construct the minimized logical circuit function in SOP form.
   (g) Using the K-Map work, write the circuit diagram of the minimized circuit.
   (h) Do the Quine-McCluskey procedure on the original circuit, show all steps in the derivation. Construct the minimized logical circuit function in SOP form.