

ECE 270 (Spring 2022)

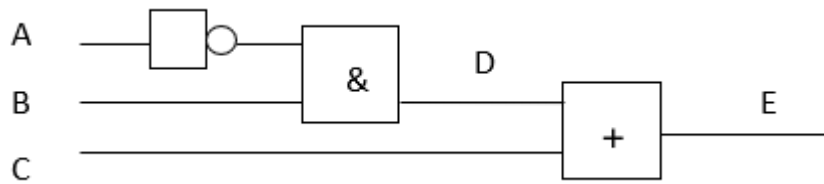
Homework 1

Due on 01/21/2022 (Friday) by 11:59 pm sharp on BrightSpace.

Note: Only legibly handwritten or typed submissions in PDF format are allowed.

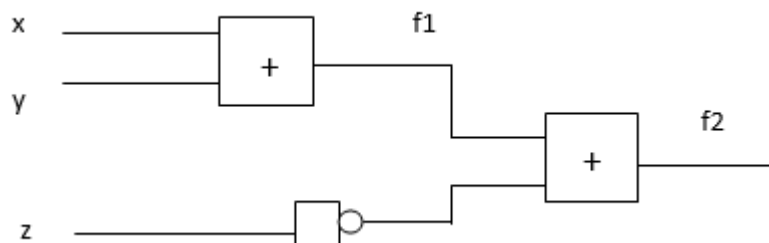
You should work alone (no discussion)

1. Complete the truth table below for all the combinations of inputs in the following circuit.



A	B	C	D	E

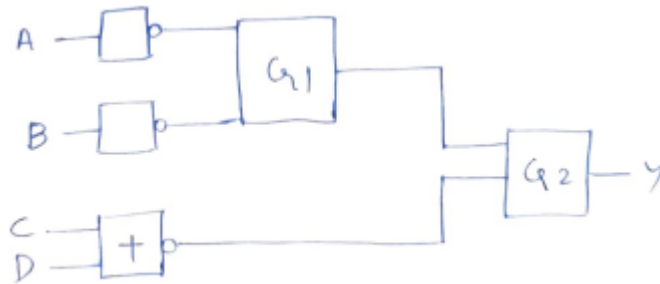
2. Prove that OR gate can be implemented using only AND and NOT gates.
3. In how many ways can a NAND gate be converted into an inverter? Show all the possibilities.
4. For the circuit shown below, use two sets of values for x, y and z (the example in the lecture uses 3 sets of values) and draw a timing diagram showing x, y, z, f1, and f2. Select the input values such that the timing diagram should have falling transitions on x, f1 and f2. Also, mark the propagation delays from x to f1 and f1 to f2 clearly.



5. Implement $A'BC$ using only OR and NOT logic gates.
6. Construct a digital circuit with 3 input OR gate and 4 inverters such that one inverter is present at each of the inputs and output of the OR gate. Draw the diagram and the

truth table for the same. Replicate the circuit behavior by redrawing a digital circuit without the use of OR gates and inverters.

7. Implement $((A+B+C)*(D+E))'$ using CMOS logic.
8. Based on your reading, what are the downsides of Programmable devices?
9. Implement a two-input (say A, B) digital circuit using transmission gates that outputs HIGH only if both the inputs are equal. (only if $A = B = 0$ or $A = B = 1$, output should be HIGH).
10. In the below circuit, the output Y is required to be $AB + C'D'$. The gates G1 and G2 must be



- (A) OR,NAND (B) NAND,OR (C) NOR,OR (D) AND,NAND