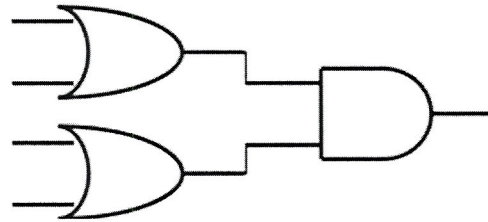Taylor Cowley
EE220 HW 3
May 6
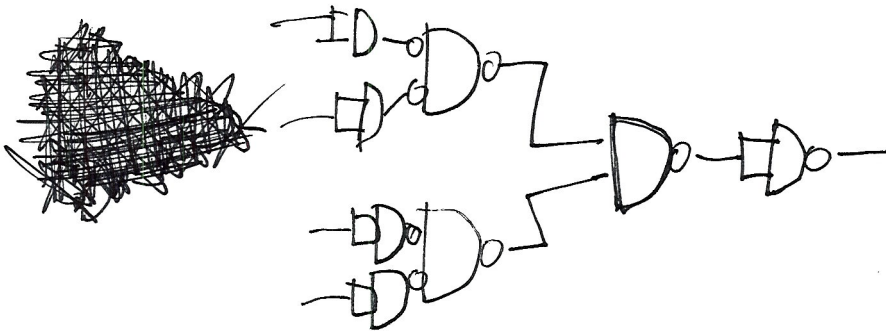
ECEn 220
Chapter 6 Homework


1. Implement the schematic above using only NOR gates.

(same as)

2. Implement the schematic above using only NAND gates.

3. Assume you have been given the assignment to design a function to determine whether the value of a 4-bit Boolean value is NOT equal to zero. A 4-bit value is zero if all of its individual bits are zero. The output of this function should be TRUE when the value of the 4-bit value is NOT zero. Draw a single-gate schematic which implements this function. Use the correct symbol and justify your answer.
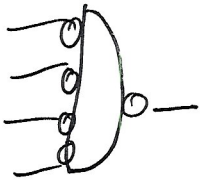
if all are zero, it prints out false

correct symbol:
↓

↑ if any are true, it prints true

↑ if any input is
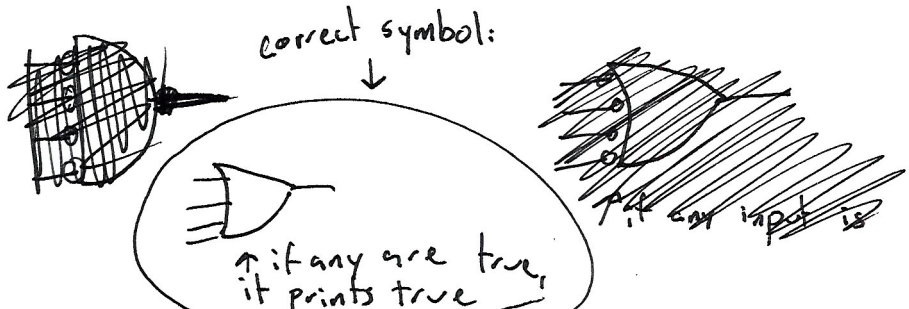
4. Bubble match the schematic below to have a non-inverted output. Then, write the logic function the circuit implements by inspection (no simplification is necessary).

A
B
E

C
D

$$(A'B'+E)''(D'C')''$$

A
B
E

C ▓
D ▓
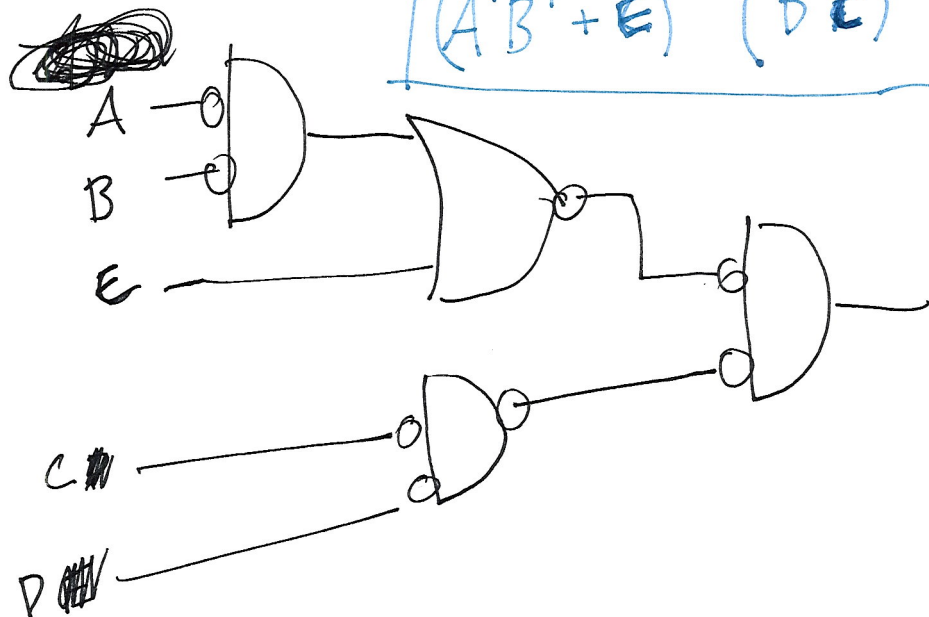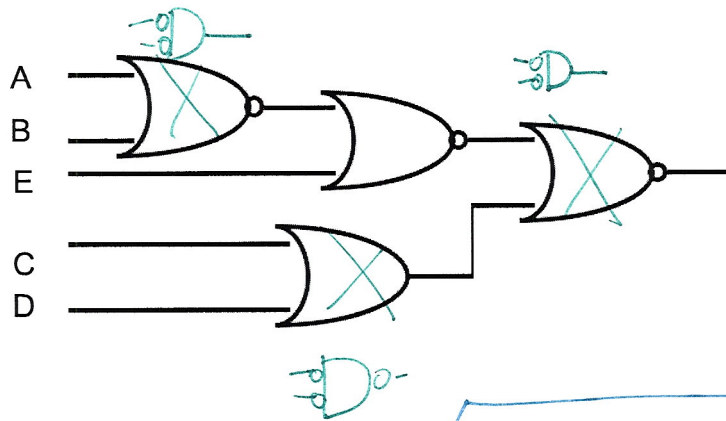
5. Bubble match the schematic in Question 4 to have an inverted output. Then, write the logic function the circuit implements by inspection.
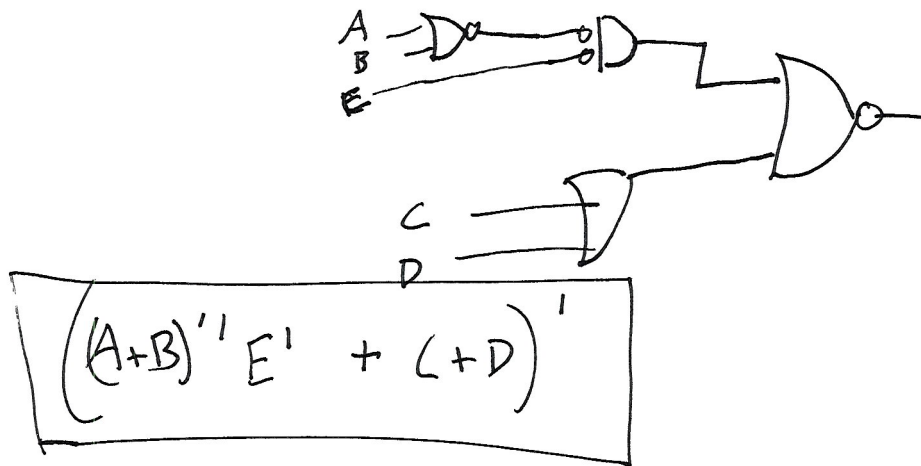
$$\left((A+B)''E' + (C+D)\right)'$$

6. Use DeMorgan's to verify that your answers to the previous two problems are equivalent.

$$(A'B' + E)'' (D'C')'' \stackrel{?}{=} \text{~~~~~~~} \left((A+B)''E' + (C+D)\right)$$

$$\left((A+B)''E' + (C+D)\right)'$$

04/28/2016

ECEn 220
Chapter 7 Homework

1. Using a KMap, prove the following equality is true.

$AB'C'+BC' = AC' + BC'$

Black   Pink

BC \ A	0	1
00	0 0	1 1
01	0 0	0 0
11	0 0	0 0
10	1 1	1 1

They are the same!

2. How many prime implicants and essential prime implicants are in the K-map below? Circle all prime implicants.

CD \ AB	00	01	11	10
00	1	1	0	1
01	1	1	1	1
11	0	1	0	1
10	1	1	0	1

Prime Implicants: 7

Essential Prime Implicants: 3

7. Consider the following problem: $F(A,B,C,D) = \Sigma m(0,1,5,6,7,10,13) + \Sigma d(2,4,9,12, 14)$. Identify and write all the prime implicant and essential prime implicant terms in its KMap. Then clearly mark (using color) the essential prime implicants.

Prime Implicants: 7

Essential Prime Implicants: 2

8. Write the minimum SOP solution to the KMap above. If multiple minimum solutions exist, show all of them.

$F = CD' + A'B + A'C' + C'D$ $F = CD' + A'B + A'C' + BC'$ $F = CD' + A'B + A'D' + C'D$

F =

04/30/2016

9. Consider the following problem: $F(A,B,C,D) = \Sigma m(0,2,3,4,5,6,7) + \Sigma d(1,8,9,10)$. Find the minimum SOP and POS solutions to this problem. If multiple minimum solutions exist, show all of them.

CD \ AB	00	01	11	10
00	1	1	0	X
01	X	1	0	X
11	1	1	0	0
10	1	1	0	X

EASY.

$$F = A'$$