EE 2720, Fall 03

Homework #5

Due Friday November 14 at 9:30 am in my office; (Room EE 245).

EE 2720, Fall 03
Homework #5

Problem 1: Consider the logic function F where F is $F = A \cdot B' + C' \cdot D + E'$. Realize F using only NAND gates using the graphical approach (bubbles etc). You must show a figure of course.

Problem 2: Consider the logic function F where F is $F = (A + B') \cdot (C' + D) \cdot E'$. Realize F using only NOR gates using the graphical approach (bubbles etc). You must show a figure of course.

Problem 3: Consider the logic function F where F is $F = A \cdot B' + C' \cdot D + E'$

(a) Realize F using NOT, AND and OR gates. This is of course going to be an AND-OR realization. Call this realization, realization #1.

(b) Realize F using only NAND gates. Do <u>not</u> use the graphical approach this time. Use an algebraic approach instead. Call this realization, realization #2.

(c). Realize F using only OR and NAND gates. Call this realization, realization #3.

(d) Realize F using only NOR and OR gates. Call this realization, realization #4.

(e) Transform realization #3 into realization #4 using the graphical approach (bubbles etc).

(f). Transform realization #4 into realization #3 using the graphical approach (bubbles etc).

Note: You must show figures here in problem 3 of course.

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Problem 4: Consider the logic function F where F is $F = (A+B')\cdot(C+C'+D)\cdot E'$.

(a) Realize F using NOT, OR and AND gates. This is of course going to be an OR-AND realization. Call this realization, realization #1.

(b) Realize F using only NOR gates. Do <u>not</u> use the graphical approach this time. Use an algebraic approach instead. Call this realization, realization #2.

(c) Realize F using only AND and NOR gates. Call this realization, realization #3.

(d) Realize F using only NAND and AND gates. Call this realization, realization #4.

(e) Transform realization #3 into realization #4 using the graphical approach (bubbles etc).

(f) Transfor realization #4 into realization #3 using the graphical approach (bubbles etc).

Note: You must show figures here in problem 4 of course

Problem 5: Consider the logic circuit of figure 1 on next page. It is an AND-OR logic circuit. Transform the circuit of figure 1 into an equivalent OR-AND logic circuit by using the graphical approach (bubbles etc). You must show a figure of course.

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Problem 5 cont:

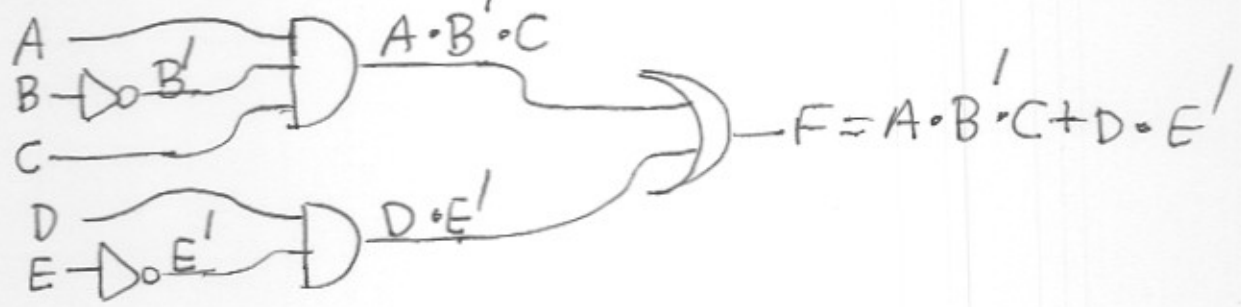

Figure 1: An AND-OR logic circuit.

Problem 6: Consider the logic circuit of figure 1 below. It is an OR-AND logic circuit. Transform the circuit of figure 1 into an equivalent AND-OR logic circuit by using the graphical approach (bubbles etc). You must show a figure of course.

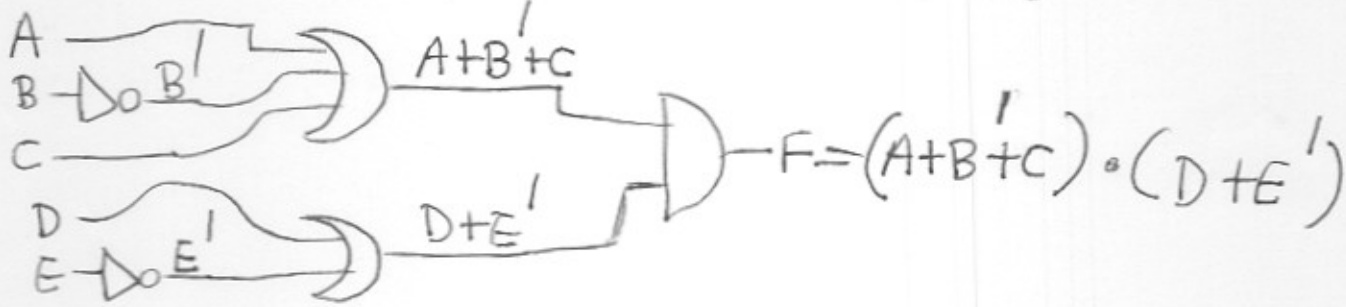

Figure 1: An OR-AND logic circuit.

Problem 7: Prove equations (5), (6), (7), (8) and (11) on page 8 of handout # 11; (they relate to the XOR operator). You are not allowed to use a truth table when proving equation (11).