EE 2720, Spring 2011

Homework #3

Due Wednesday March 16, 2011 in class.

Important Note: for problem 3 use the theorem that states

$$X + Y \cdot Z = (X + Y) \cdot (X + Z)$$

Enjoy your homework

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NOTE: Please STAPLE your homework.

Problem 1: Prove theorem (T11′) of handout #5. You are not allowed to use the Principle of Duality. In other words don't tell me that because (T11) is true so is (T11′). You are also not allowed to use a truth table. Hint: Use the theorem that states $(X + Y) \cdot (X' + Z) = X \cdot Z + X' \cdot Y$

Problem 2: Write the canonical sum and canonical product for each of the following logic functions:

(a) $F = \Sigma_{X,Y}(1,2)$

(b) $F = \Pi_{A,B}(0,1,2)$

(c) $F = \Sigma_{A,B,C}(3,4,6,7)$

(d) $F = \Pi_{M,N,P}(0,1,3,6,7)$

(e) $F = X + Y' \cdot Z'$

(f) $F = A' \cdot B + B' \cdot C + A$

Problem 3: Write the canonical product for the following logic function:

$F = (a+b) \cdot (a+c) \cdot (b+c)$

You are not allowed to provide the canonical sum first and then convert it into canonical product.

Hint: $X \cdot X' = 0$ and $X + 0 = X$. Now the problem is not that difficult.

Problem 4: Consider the logic function F where F is $F = A \cdot B' + C' \cdot D + E'$. Realize F using only NAND gates. Use both the algebraic as well as the graphical approach. You must show figures of course.

Problem 5: Consider the logic function F where F is $F = (A + B') \cdot (C' + D) \cdot E'$. Realize F using only NOR gates. Use both the algebraic as well as the graphical approach. You must show figures of course.

Problem 6: 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).