

EE 2720, Fall 2010

Homework # 3

Due Wednesday October 20, 2010 in class

IMPORTANT NOTE: For problem 3 use the

theorem that states:

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

Enjoy your homework!

Alex

EE 2720, Homework # 3

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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) $F = \sum_{x,y} (1, 2)$

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

(c) $F = \sum_{A,B,C} (2, 4, 6, 7)$

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

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

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

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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~~ $X \cdot X' = 0$ 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.

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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).