

University of New Brunswick

Computer Science

Logic Synthesis

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ASSIGNMENT 9

Problem 1. Let $A, B, C, D \subseteq P$, $A \cap C = \phi$ and $D \subseteq B$. Then prove the following equation (reshape operation):

$$X^A \cdot Y^B \vee X^C \cdot Y^D = X^{A \cup C} \cdot Y^D \vee X^A \cdot Y^{B \cap \bar{D}}$$

Problem 2. We want to design a AND-OR two-level logic network for the table below. Assign the codes for the inputs and outputs, so that the network becomes as simple as possible.

Input	Output
I_0	U_0
I_1	U_1
I_2	U_2
I_3	U_3
I_4	U_1
I_5	U_2
I_6	U_1

Problem 3. By using Algorithm 10.2, obtain the essential prime implicants for the function $f = \bar{x}_1 \bar{x}_2 \bar{x}_3 \vee x_1 x_2 \vee x_3 x_4$.

Problem 4. WGT4 counts the number of 1's in the inputs, and represents it by a binary number. Design WGT4 by using a PLA with 2-bit input decoders.

Problem 5. Design a PLA with 2-bit input decoders that realizes the 6-bit input function f , where $f = 1$ iff the number of 1's in the input are exactly 3. Explain your choice of pairing variables.