Cpr E 281 HW05
ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

Karnaugh Maps
Assigned Date: Fifth Week
Due Date: Feb. 17, 2014

For this homework, the cost of a circuit is considered to be the total number of gates plus the total number of inputs.

P1. (10 points) Find the simplest realization of the following function

$f(x_1, \ldots, x_4) = \Sigma\, m(0, 3, 4, 7, 9, 10, 13, 14)$,

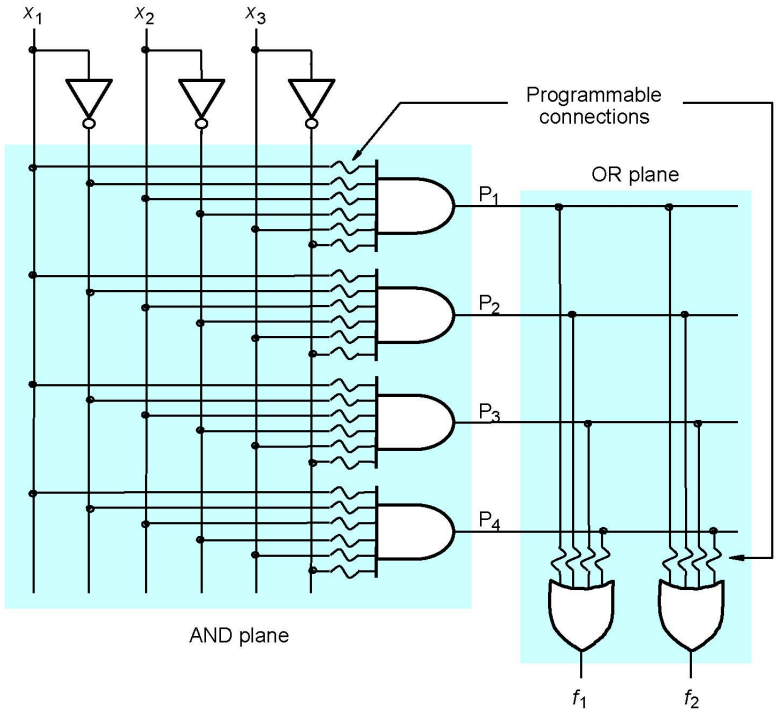
assuming that you can only use NOT gates, 2-input AND gates and 2-input OR gates. Note that it is **not** necessary to restrict your circuit to SOP or POS form.

P2. (10 points) Problem 2.48 in the book. Please show your steps.

P3. (10 points) Implement the following two functions at the same time into the following PLA (with 3 inputs, four AND gates in AND plane, and two OR gates in OR plane).

f1 = x1' x2' x3' + x1' x2 x3' + x1' x2' x3 + x1 x2 x3

f2 = x1' x2' x3' + x1 x2' x3' + x1' x2' x3 + x1 x2 x3



You may need to simplify the functions in order to incorporate all the product terms into the PLA. To simplify your figure, you may draw the PLA in customary schematic as shown in Figure B.27 in textbook.

Karnaugh Maps
Assigned Date: Fifth Week
Due Date: Feb. 17, 2014

P4. (10 points) Problem 2.67 in the textbook. Please solve this problem by drawing K-maps for both functions and then compare them.

P5. (10 points) Problem 2.69 in the textbook.

P6. (10 points) Problem 2.70 in the textbook.

P7. (10 points) Problem 2.73 in the textbook. How many NAND gates are you using?

P8. (10 points) Problem 2.75 in the textbook. How many NOR gates are you using?

P9. (10 points) Problem 2.77 in the textbook.

P10. (10 points) Jointly minimize the functions for segments D and F to display digits from 0 to 9 in a 7-segment display.