Homework #2

Homework assigned Tues 15 Nov to be collected on Tues 22 Nov

Problems from Chapter 2 {pp 84, 85 } [1]

2-21 Optimize the following Boolean functions in product of sums (POS) form

(a) $F(W, X, Y, Z) = \sum m(0, 2, 3, 4, 8, 10, 11, 15)$ [5]

(b) $F(A, B, C, D) = \prod M(0, 2, 4, 5, 8, 10, 11, 12, 13, 14)$ [5]

2-24 Optimize the following functions F, together with the don't care conditions d:

(a) $F(A, B, C, D) = \sum m(0, 3, 5, 7, 11, 13); \quad d(A, B, C, D) = \sum m(4, 6, 14, 15)$ [5]

(b) $F(W, X, Y, Z) = \sum m(0, 6, 8, 13, 14); \quad d(W, X, Y, Z) = \sum m(2, 4, 7, 10, 12)$ [5]

(c) $F(A, B, C) = \sum m(0, 1, 2, 4, 5); \quad d(A, B, C) = \sum m(3, 6, 7)$ [5]

Problem from Chapter 3 {p 133 } [1]

3-19   {What follows is an adaptation of the original question} Complete the design of a BCD to seven segment decoder by performing the following steps:

a) Plot the seven K-Maps for each of the outputs for the BCD-to-seven-segment decoder specified in table 3.2.

     [35]

b) Simplify the seven output functions in SOP form from the K-maps, design the logic circuit using gates of your choice and determine the total number of gate inputs that will be needed to implement the decoder. Use the text as a guide. Draw a schematic of the finished design using the B^2 Spice package and carefully document the drawing. Submit a single printed page with your schematic clearly arranged on it.

     [15]

c) Verify that your circuit operates to light a seven segment LED display in the same way that a dedicated 7 segment display driver does. You will need to find an IC that performs this function. Use the B^2 Digital Logic simulator and accompanying literature with this step. Present one example of your circuit on the same page as that of a dedicated 7 segment display driver IC showing the resulting display with a number of your choice applied as a BCD code to the driver.

     [25]

TOTAL POINTS   **[100]**

Notes: (1) Approved textbook "Logic and Computer Design Fundamentals" M Morris Mano and Charles R Kime 3rd edition, Pearson Prentice-Hall ISBN 0-13-140539-X