Homework #4

due: Thursday, February 24, 2011

1. Roth and Kinney, problem 5.19

2. (a) Plot the following function on a Karnaugh Map. (Do not expand to minterm form before plotting.)

   \[ F(A,B,C,D) = A'B' + CD' + ABC + A'B'CD' + ABCD' \]

   (b) Find the minimum Sum of Products (SOP) expression.

   (c) Find the minimum Product of Sums (POS) expression.

3. Find the minimum Sum of Products (SOP) expression for each of the following:

   (a) \( F(A,B,C,D) = \Sigma m(0, 2, 3, 4, 7, 8, 14) \)

   (b) \( F(A,B,C,D) = \Pi M(1, 2, 3, 4, 9, 15) \)

4. Find the minimum Product of Sums (POS) expression for each of the functions given in problem #3.
5. Find the minimum Sum of Products (SOP) expression for each of the following:

(a) \( F(A,B,C,D) = \Sigma m(0, 2, 6, 9, 13, 14) + \Sigma d(3, 8, 10) \)

(b) \( F(A,B,C,D) = \Pi M(0, 2, 6, 7, 9, 12, 13) . \Pi D(1, 3, 5) \)

6. Find the minimum Product of Sums (POS) expression for each of the functions given in problem #5.

7. Find the minimum Sum of Products (SOP) expression for each of the following functions. Underline the essential prime implicants in your answer.

(a) \( F(A,B,C,D) = \Pi M(0, 2, 4, 5, 6, 9, 14) . \Pi D(10, 11) \)

(b) \( F(A,B,C,D) = \Sigma m(1, 3, 8, 9, 15) + \Sigma d(6, 7, 12) \)

8. Find the minimum Product of Sums (POS) expression for each of the functions given in problem #7. Underline the essential prime implicants in your answer.