

Homework #3: Due Monday Feb 11

1. Modify and simplify to obtain the canonical sum of products (SOP) form.
 - a. $Y = (A + B)(C + B) + (\bar{D} + B)(AC\bar{D} + E)$
 - b. $Y = (\bar{A} + B + \bar{C})(\bar{A} + \bar{C} + D)(\bar{B} + \bar{D})$

2. Simplify each of the following expressions by applying the theorems of Boolean algebra. State the theorems used (e.g. T3).
 - a. $Y = \overline{\bar{A}BC} + \overline{(\bar{A}\bar{B}C)}$
 - b. $Y = A + B + \bar{C}D\overline{(A + B)}$
 - c. $Y = A(B + \bar{C}D) + B + \bar{C}D$
 - d. $Y = (\bar{A}B + C\bar{D})(\bar{A}B + CD)$

3. Implement the following using a 2-to-1 multiplexer and logic gates:
$$Y = \bar{A}\bar{B} + \bar{A}B + AB.$$

4. Implement the equation of Problem 3 using a 2-to-4 decoder and logic gates.

5. Implement the equation of Problem 3 using only NAND gates and inverters.

6. Implement the logic equation $Y = (\overline{AB} + C) + (B + \bar{D})$ using only NAND gates and inverters. (Implement it as multilevel logic; do *not* expand it into minterms to implement as 2-level logic.)

7. Implement the equation of Problem 7 using a multiplexer.

8. A 3-input Boolean function with inputs A, B and C is described by the minterms $Y(A, B, C) = \sum m(1,2,6,7)$. Write this expression out in canonical SOP form.