King Fahd University of Petroleum and Minerals
Department of Electrical Engineering
EE 200 Digital Logic Circuit Design
Dr. H. Ragheb
HW No. 3 (Due Wed. March 21)

1. For each of the truth tables shown below, write the corresponding minterm canonical formula in algebraic form and in *m*-notation

x	*y*	*z*	*f*
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

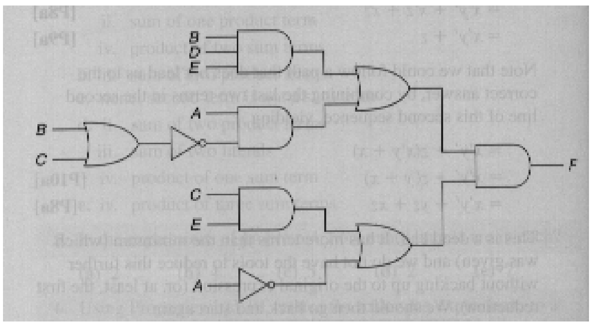
w	*x*	*y*	*z*	*f*
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

2. For each of the truth tables shown, write the corresponding maxterm canonical formula in algebraic form and in *M*-notation

3- Show a block diagram of a system using AND, OR, and NOT gates to implement the following function. Assume that variables are available only uncomplemented. Do not manipulate the algebra.

$$F = (X(\overline{Y+Z}) + YWX)(\overline{W} + WZ)$$

4- For the following circuit:
(i) find an algebraic expression. (ii) put it in sum of product form.



5- Reduce the following expressions to a minimum sum of products form, using the postulates and theorems. Show this simplification (number of terms and number of literals in minimum shown in parentheses). Also, show the steps appear on Karnaugh maps.

(a) $\bar{p}\,\bar{q}\,r + \bar{p}\,q\,\bar{r} + \bar{p}\,q\,r + p\,q\,\bar{r} + p\,\bar{q}\,\bar{r}$ (3 terms, 6 literals)

(b) $\bar{x}\,\bar{y}\,\bar{z} + \bar{x}\,\bar{y}\,z + \bar{x}\,y\,z + x\,\bar{y}\,z + x\,y\,z + x\,y\,\bar{z}$ (3 terms , 5 literals)

6- For each of the following, find all minimum sum of product expressions. (If there is more than one solution, the number of solutions is given in parentheses.)

(a) $G(x, y, z) = \sum m(1, 2, 3, 4, 6, 7)$

(b) $f(w, x, y, z) = \sum m(2, 5, 7, 8, 10, 12, 13, 15)$

(c) $g(a, b, c, d) = \sum m(0, 6, 8, 9, 10, 11, 13, 14, 15)$ (2 solutions)

(d) $f(a, b, c, d) = \sum m(0, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15)$ (2 solutions)

(d) $f(a, b, c, d) = \sum m(0, 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 15)$ (2 solutions)

(d) $g(a, b, c, d) = \sum m(0, 2, 3, 5, 7, 8, 10, 11, 12, 13, 14, 15)$ (4 solutions)