

Name _____ Student ID _____ Colleges & Schools _____ Department _____

Homework Unit 6

1. Find all of the prime implicants using the Quine-McCluskey method, and then using a prime implicant chart, find all minimum sum-of-products solutions for the function given below

$$F(a, b, c, d) = \sum m(2, 4, 5, 6, 9, 10, 11, 12, 13, 15)$$

2. Packages arrive at the stockroom and are delivered on carts to offices and laboratories by student employees. The carts and packages are various sizes and shapes. The students are paid according to the carts used. There are five carts and the pay for their use is

Cart C1: \$2, Cart C2: \$1, Cart C3: \$4, Cart C4: \$2, Cart C5: \$2

On a particular day, seven packages arrive, and they can be delivered using five carts as follows:

C1 can be used for packages P1, P3, and P4.

C2 can be used for packages P2, P5, and P6.

C3 can be used for packages P1, P2, P5, P6, and P7.

C4 can be used for packages P3, P6, and P7.

C5 can be used for packages P2 and P4.

The stockroom manager wants the packages delivered at minimum cost. Using minimization techniques described in this unit, present a systematic procedure for finding the minimum cost solution.

3. Shown below is the prime implicant chart for a completely specified four-variable combinational logic function $f(w, x, y, z)$.
 - (a) Algebraically express f as a product of maxterms.
 - (b) Give algebraic expression for the prime implicants labeled A, C, and D in the table.
 - (c) Find all minimal sum-of-product expressions for f . You do not have to give algebraic expressions; instead just list the prime implicants (A, B, C, etc.) required in the sum(s).

	0	4	5	6	7	8	9	10	11	13	14	15
A	x	x										
B			x		x					x		x
C				x	x						x	x
D						x	x	x	x			
E								x	x		x	x
F							x		x	x		x
G	x					x						
H		x	x	x	x							

4. Find all prime implicants of the following function, and then find all minimum solutions using Petrick's method:

$$F(A, B, C, D) = \sum m(7, 12, 14, 15) + \sum d(1, 3, 5, 8, 10, 11, 13)$$