

Digital Systems – Exercise 6

Karnaugh Maps

- 1) Write the minimal expression corresponding to the following map. Indifferent variables are represented by the letter 'd' (don't care).

		WX			
		00	01	11	10
YZ	00	1	d		
	01	1	1	1	d
	11		1		1
	10		1	1	

- 2) Given the following function: $F(a,b,c,d) = \Sigma(1,2,3,11,12,13,14,15) + d(5,7,9)$

- Make a Karnaugh Map.
- Find the minimal terms in the SOP expression.

- 3) Reduce the following expressions to SOP and POS forms using Karnaugh maps:

- $x' + xyz' + (x + x'y'z)(x(x' + y' + z))'$
- $(x + xy)(x + x'z)(y' + yz') + (x(y' + z'))'$

- 4) Reduce the following function to SOP and POS forms using Karnaugh maps:

$$F(a,b,c,d,e) = \Pi(4,6,7,9,11,12,13,14,15,20,22,25,27,28,30) \cdot d(1,5,29,31)$$

Quine-Mcclusky Tables

- 1) Reduce the following function to SOP and POS forms using the Quine-Mcclusky method:

$$F_{abcde} = \Pi(6, 7, 14, 15, 17, 19, 21, 23, 25, 29) \bullet d(1, 5, 9, 13, 18, 22, 30)$$

- 2) Given the function:

$$f(W, X, Y, Z) = \Sigma(0,1,3,5,8,10,11,12) + d(9,14)$$

- a. What are the Prime Implicants (PI) of the function?
- b. What are the Essential Prime Implicants (EPI) of the function?
- c. What is the minimal expression in SOP form?