

CSE303 Logic Design II – Tutorial 01

#	Student ID	Student Name	Grade (10)
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Q1

7.10 Find a minimum two-level, multiple-output AND-OR gate circuit to realize these functions.

$$f_1(a, b, c, d) = \sum m(3, 4, 6, 9, 11)$$

$$f_2(a, b, c, d) = \sum m(2, 4, 8, 10, 11, 12)$$

$$f_3(a, b, c, d) = \sum m(3, 6, 7, 10, 11) \quad (11 \text{ gates minimum})$$

Sol 1

c d		a b			
		00	01	11	10
00		1			
01				1	
11	1			1	
10		1			

$$f_1 = ab'd + \underline{b'cd} + a'bd'$$

c d		a b			
		00	01	11	10
00		1	1	1	
01					
11				1	
10	1			1	

$$f_2 = \underline{ab'c} + b'cd' + bc'd' + ac'd'$$

$$f_2 = \underline{ab'c} + b'cd' + bc'd' + ab'd'$$

11 gates

		a b			
c d		00	01	11	10
00					
01					
11		1	1		1
10			1		1

$f_3 = \underline{ab}c + \underline{b'cd} + a'bc$

Q2

7.11 Find a minimum two-level OR-AND circuit to simultaneously realize

$$F_1(a, b, c, d) = \sum m(2, 3, 8, 9, 14, 15)$$

$$F_2(a, b, c, d) = \sum m(0, 1, 5, 8, 9, 14, 15)$$

(minimum solution has eight gates)

Sol 2

		a b			
c d		00	01	11	10
00		0	0	0	1
01		0	0	0	1
11		1	0	1	0
10		1	0	1	0

$F_1 = (a + c)(a + b')(a' + b' + c)(a' + b + c')$



		a b			
		00	01	11	10
c d	00	1	0	0	1
	01	1	1	0	1
	11	0	0	1	0
	10	0	0	1	0

$$F_2 = (b'+c+d)(a'+b'+c)(a+c')(\underline{a'+b+c'})$$

$$F_2 = (a+b'+d)(\underline{a'+b'+c})(a+c')(\underline{a'+b+c'})$$

8 gates