

Homework 1

Ahmet Tugkan Ayhan

1901042692

$$\begin{aligned} 1) F(x, y, z) &= xy + x'z + yz \\ &= xy(z+z') + x'z(y+y') + yz(x+x') \\ &= xyz + xyz' + x'yz + x'y'z + \cancel{xyz} + \cancel{x'y'z} \\ &= xyz + xyz' + x'yz + x'y'z \\ &= xy(z+z') + x'z(y+y') \\ &= xy + x'z \end{aligned}$$

$$2) * (x+y)(x'+z)(y+z)$$

$$* (xx' + xz + yx' + yz)(y+z)$$

$$* (xz + yx' + yz)(y+z)$$

$$* (xyz + x'y + yz + xz + x'yz + yz)$$

$$* (yz(x+x'+1+1) + x'y + xz)$$

$$* yz(x+x') + x'y(z+z') + xz(y+y')$$

$$* xyz + x'yz + x'yz + x'yz' + xyz + xy'z$$

$$* xyz + x'yz + x'yz' + xy'z$$

$$* xz(y+y') + x'y(z+z')$$

$$* xz + x'y \equiv (x'+z)(x+y) \text{ De Morgan}$$

3) a) $F(A, B, C, D) = B'D + A'D + BD$

A	B	C	D	B'D	A'D	BD	F	minterm	maxterm
0	0	0	0	0	0	0	0		
0	0	0	1	1	1	0	1	m_0	M_0
0	0	1	0	0	0	0	0	m_1	M_1
0	0	1	1	1	1	0	1	m_2	M_2
0	1	0	0	0	0	0	0	m_3	M_3
0	1	0	1	0	1	1	1	m_4	M_4
0	1	1	0	0	0	0	0	m_5	M_5
0	1	1	1	0	1	1	1	m_6	M_6
1	0	0	0	0	0	0	0	m_7	M_7
1	0	0	1	1	0	0	1	m_8	M_8
1	0	1	0	0	0	0	0	m_9	M_9
1	0	1	1	1	0	0	1	m_{10}	M_{10}
1	1	0	0	0	0	0	0	m_{11}	M_{11}
1	1	0	1	0	0	1	1	m_{12}	M_{12}
1	1	1	0	0	0	0	0	m_{13}	M_{13}
1	1	1	1	0	0	1	1	m_{14}	M_{14}
								m_{15}	M_{15}

$$F(ABCD) = (A'B'C'D) + (A'B'CD) + (A'BC'D) + (A'BCD) + (AB'CD) + (ABC'D) + (ABCD)$$

★ minterm

$$= \sum m(1, 3, 5, 7, 9, 11, 13, 15)$$

$$F(ABCD) = (A+B+C+D) \cdot (A+B+C+D') \cdot (A+B'+C+D) \cdot (A+B'+C'+D) \cdot (A'+B+C+D) \cdot (A'+B+C'+D) \cdot (A'+B'+C+D) \cdot (A'+B'+C'+D)$$

$$= \prod M(0, 2, 4, 6, 8, 10, 12, 14) \quad \star \text{maxterm}$$

$$b) F(A, B, C, D) = B'D + A'D + BD$$

$$* B'D + A'D + BD$$

$$* D(B + B' + A')$$

$$* D(1 + A')$$

$$* D(1)$$

$$* D$$