

Q1 a)  $(AB+c) \cdot (\bar{A}\bar{c} + \bar{B}\bar{c}) = A\bar{A}B\bar{c} + AB\bar{B}\bar{c} + \bar{A}c\bar{c} + B\bar{c}c = 0$   
 b)  $(AB+c) + (\bar{A}\bar{c} + \bar{B}\bar{c}) = AB+c + \bar{A}\bar{c} + \bar{B}\bar{c} = AB+c + \bar{c} + \bar{B}\bar{c} = 1$

b)  $AB\bar{c} + B\bar{c}\bar{D} + A\bar{c}D + \bar{A}BC + \bar{B}C\bar{D} + A\bar{C}\bar{D}$   
 $AB + B\bar{D} + A\bar{C}D + A\bar{C}\bar{D} = AB + B\bar{D} + A(C \oplus \bar{C})$

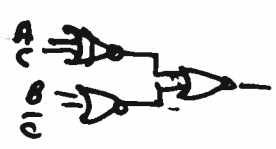
c)  $(AB+cD) \cdot (\bar{A}\bar{B}\bar{c}\bar{D}) = (\bar{A}\bar{B} \cdot \bar{c}\bar{D}) + (A+B+C+D)$   
 $= [(\bar{A}+\bar{B})(\bar{c}+\bar{D})] + (A+B+C+D)$   
 $= \bar{A}\bar{c} + \bar{A}\bar{D} + \bar{B}\bar{c} + \bar{B}\bar{D} + A+B+C+D$   
 $\bar{c} + A + c + \dots = 1$

Q2 Midterm Oct 2015

Q2 i)  $F = AB + A\bar{c} + BC$   
 $F = (A+c)(B+\bar{c})$   
 $= \overline{(A+c)(B+\bar{c})} = \overline{(A+c)} + \overline{(B+\bar{c})}$

	00	01	11	10
0	0	0	1	1
1	0	1	1	0

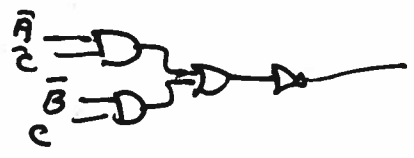
$= (A+c)(B+\bar{c})$



ii)  $\bar{F} = \bar{A}\bar{c} + \bar{B}c$   
 $F = \overline{\bar{A}\bar{c} + \bar{B}c}$

	00	01	11	10
0	1	1		
1	1			1

$= \bar{A}\bar{c} + \bar{B}c$



b)  $(\bar{B} + \bar{c})(B + c + \bar{D})$

ab	00	01	11	10
cd	00	1	X	X
01	0	1	1	0
11	1	0	0	1
10	X	X	X	X

Q3

POS of F

a)  $F = (A + BcD) + (B + cD)$

$F = (A+B)(A+c)(A+D) \cdot (B+c) \cdot (B+D)$

b) Minterm list of  $F(A,B,c,D) = AB$

$F = AB(c + \bar{c})(D + \bar{D}) = ABCD + ABC\bar{D} + AB\bar{c}D + AB\bar{c}\bar{D}$

$F = \sum m(12, 13, 14, 15)$

c) Maxterm list of  $F(A,B,c,D) = ABC + CD + \bar{c}B$

Plot the function on the K-map

reading from the K-map

$F = \sum M(0, 1, 2, 4, 5, 8, 9, 10, 12, 13)$

	AB	00	01	11	10
CD	00	0	0	0	0
	01	0	0	0	0
	11	1	1	1	1
	10	0	1	1	0

d)

$PI_1 = m_0 + d(2, 4, 6, 8, 10, 12, 14) = \bar{a}$

$PI_2 = m(5, 7) + d(4, 6) = \bar{a}b$

$PI_3 = m(3, 7) + d(2, 6) = \bar{a}c$

$PI_4 = m(3, 11) + d(2, 10) = \bar{b}c$

	AB	00	01	11	10
CD	00	1	X	X	X
	01		1		
	11	1	1		1
	10	X	X	X	X

$PI_1, PI_2, PI_4$  are Essential

$F = \bar{a} + \bar{a}b + \bar{b}c$