Sarita Sangrez

23i-2088

Date: C4-A.

DLD

Assignment 2.

2.3 a) $ABC + A'B + ABC'$

$ABC(C + C') + A'B$

$AB + A'B$.

$B(A + A') = B$.

b) $x'yz + xz$.

$z(x'y + x)$ $\quad x + \bar{x}y = x + y$

$z(y + x)$

c) $(x+y)'(x'+y')$

$\overline{x+y} = \bar{x}.\bar{y}$

$x'y'(x'+y')$

$x'y'$

d) $xy + x(wz + wz')$

$x(y + wz + wz')$

$x(w + y)$

e) $(BC' + A'D)(AB' + CD')$

$\cancel{BC'AB'}^{0} + \cancel{BC'CD'}^{0} + \cancel{A'DAB'}^{0}$

$+ \cancel{A'DCD'}^{0} = 0$

f) $(a' + c')(a + b' + c')$

$\cancel{a'a}^{0} + a'b' + a'c' + c'a + c'b'$

$+ \cancel{c'c'}^{0}$

$\times [a'(a + b' + c') + c'(a + b' + c')]$

$\times [(a' + c')(a + b' + c')]$

$b'(a' + c') + c'(\cancel{a + a'}^{1})$

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

$= c' + a'b'$

2.4. a) $A'C' + ABC + AC'$

$C'(\cancel{A' + A})^{1} + ABC$

$C' + ABC$.

$(\cancel{C' + C})(C' + AB')$

$= C' + AB$.

b) $(x'y' + z)' + z + xy + wz$. $\qquad (\overline{A+B}) = \bar{A}\cdot\bar{B}$, $\overline{A\cdot B} = \bar{A} + \bar{B}$

$(x'y')'(z)' + z + xy + wz$

Using $A'B + A = A + B$

$\times [z'(x + y) + z] + xy + wz] \times$

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

$(\cancel{z + z'})(z + x + y) + xy + wz$

$z + x + y + xy + wz$

$xy(z') + z$

$x + y + z + xy + wz$.

$x(\cancel{1 + y}) + y + z(\cancel{1 + w})$

$x + y + z$.

c) $A'B(D' + C'D) + B(A + A'CD)$

$B(A'D' + A'C'D + A + A'CD)$

$B(A'D' + A + A'D(\cancel{C + C'}))$

$B(A + A'(\cancel{D' + D}))$

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d) $(A'+C)(A'+C')(A+B+C'D)$

$(\cancel{A'}A' + A'C' + CA' + \cancel{CC'})(A+B+C'D)$

$(A'C' + CA')(A+B+C'D)$

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

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

$\cancel{A'A} + A'B + A'C'D$

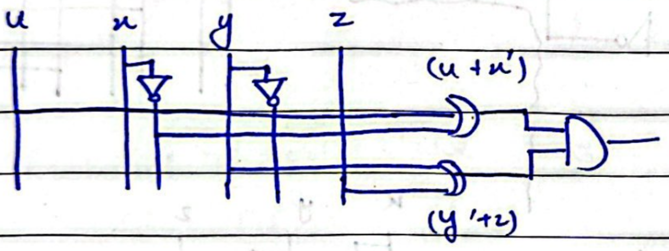
$A'(B+C'D)$

e) $ABCD + A'BD + ABC'D$

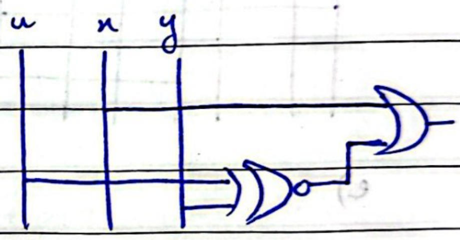
$ABD(C + C') + A'BD$

BD.

2.13. a) $(u+x')(y'+z)$



b) $Y = (u \text{ XOR } y)' + x$



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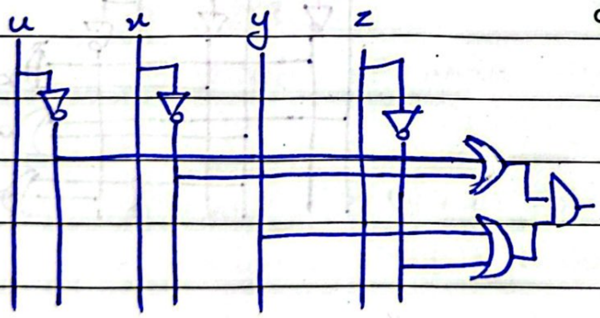

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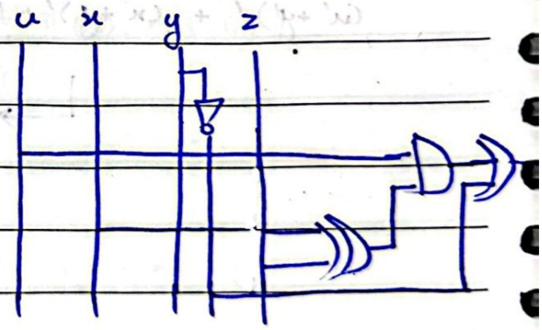
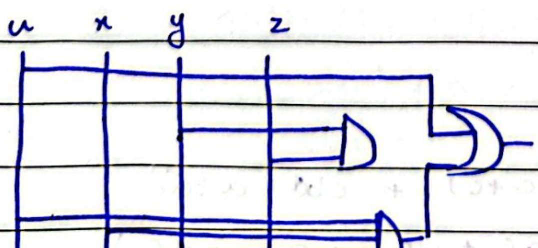
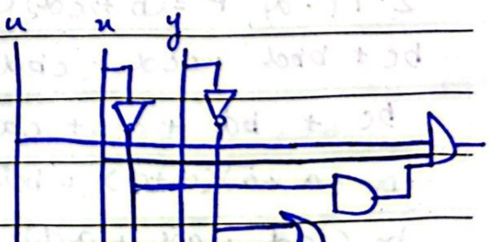


e)



f)



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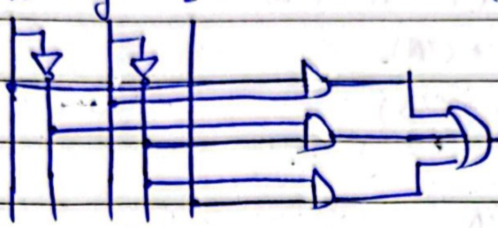
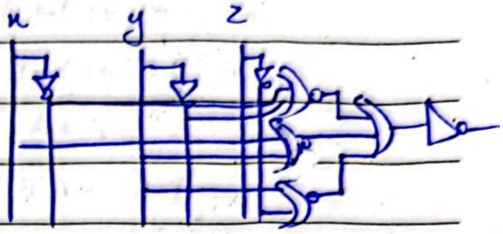
2.14 . a) $xy + x'y' + y'z$



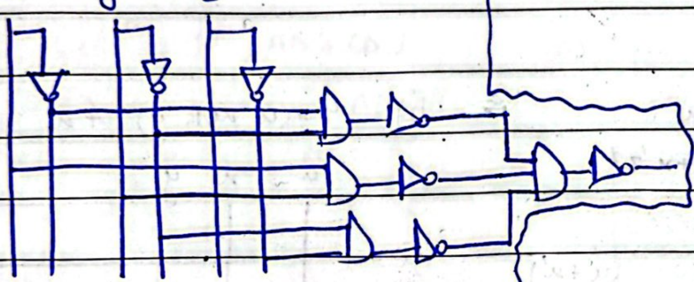
b) $xy + x'y' + y'z$

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



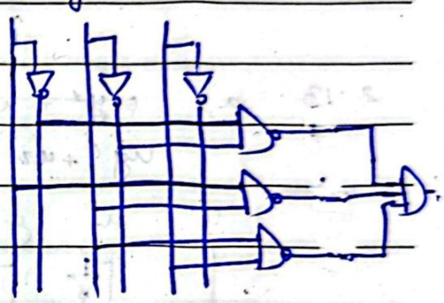
c) $xy + x'y' + y'z$

$[(xy)'(x'y')'(y'z)]'$



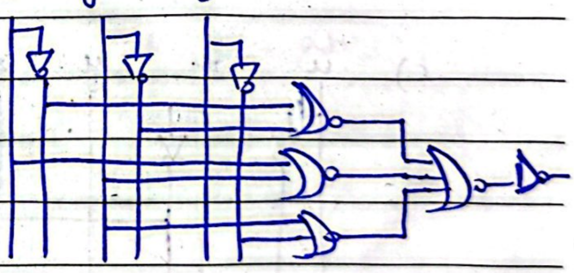
d) $xy + x'y' + y'z$

$[(xy)'(x'y')'(y'z)']'$



e) $xy + x'y' + y'z$

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



2.17 . a) $F = (b+cd)(c+bd)$

$bc + bbd + ccd + cbdd$

$bc + bd + cd + cbd$

$bc(a+\bar{a})(d+\bar{d}) + bd(a+\bar{a})(c+\bar{c}) + cbd(a+\bar{a})$

$bc(ad + a\bar{d} + \bar{a}d + \bar{a}\bar{d}) + bd(ac + a\bar{c} + \bar{a}c + \bar{a}\bar{c}) + cabd + c\bar{a}bd$

$= \underline{a}dbc + a\bar{d}bc + \bar{a}bc\bar{d} + ab\underline{d}c + ab\bar{c}d + \bar{a}bcd + \bar{a}b\bar{c}d$

$+ \underline{a}bcd + a\bar{b}c\bar{d}$

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a	b	c	d	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1

$F' = \Sigma(0,1,2,4)$

$F = \Pi(0,1,2,4)$

b) $bcd + bd' + cd + b'cd$

$= cd + bd'$

$cd(b+b') + bd'(c+c')$

$cdb + cdb' + \overset{bcd'}{bd'c} + bd'c'$

a	b	c	d	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1

$F = \Sigma(3,4,7)$, $F\,\Pi(0,1,2,5,6)$

c) $bc' + c' + bd + c'd = c' + bd$.

$F = \Sigma(0,1,4,5)$

$F = \Pi(2,3,6)$

d) $bd' + acd' + ab'c + a'c'$

$\Sigma(0,1,4,5)$.

$F = \Pi(0,2,3,6)$.

(worked at above tables)

2.2. a) $xy + xy' = x(y+y') = x$.

b) $(x+y)(x+y') = x + yy' = x(x+y') + y(x+y') = xx + xy' + xy + yy' = x$

c) $xyz + x'y + xyz' = xy(z+z') + x'y = xy + x'y = y$

d) $(A+B)'(A'+B') = A'B'(AB) = A'B'(BA) = A'(B'B)A = 0$

e) $(a+b+c')(a'b'+c) = \cancel{aa'b'} + ac + \cancel{ba'b'} + bc + c'a'b' + \cancel{c'c} = ac + bc + c'a'b'$

f). $a'bc + abc' + abc + a'bc' = a'b(c+c') + abc(c+c') = a'b + ab$

$= (a'+a)b = b.$

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$A + AB = A$

2.22 a) $(u + xw)(x + u'v)$

$ux + uu'v' + xwx + xwu'v$

$ux + xw + xwu'v$.

$x(u + w + wu'v)$

$x(u + w)$

SOP: $xu + xw$.

POS: $x(u+w)$

b) $x' + x(x+y')(y+z')$

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

$x' + xy + xz' + xy'z'$

SOP: $x' + xy + xz'$

POS: $x' + y + z'$.

2.29. $x'y' + x'z + x'z' = x'z' + y'z' + x'z$

RHS: $x'(z'+z) + y'z'$

$x'(1) + y'z'$

$y'z' + x'$

LHS: $x'y' + x'(z+z') =$

$x'y' + x'$

$x'(y'+1) = x'$.

$x' \neq x' + y'z'$ False.

2.30. $(b+d)(a'+b'+c)$

$ba + bb' + b'c + da' + db' + dc$

$ba(c+c')(d+d') + b'c(a+a')(d'+d) + db'(a+a')(c+c') + dc(a+a')(b'+b)$

$= ba(cd + cd' + c'd + c'd')$

$= b'c(ad' + ad + a'd' + a'd)$

$= db'(ac + ac' + a'c + a'c')$

$= dc(ab' + ab + a'b' + a'b)$

$= (bacd + bacd' + bac'd + bac'd') + (b'cad' + b'acd + b'a'cd' + \cancel{b'a'cd}) + (\cancel{b'acd} + b'ac'd + \cancel{b'a'cd} + ba'c'd) + (\cancel{b'acd} + \cancel{bacd} + b'a'cd + ba'cd)$

SOP $= bacd + bacd' + bac'd + bac'd' + b'cad' + b'acd + b'a'cd' + b'a'cd + b'ac'd + ba'c'd + ba'cd$

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2.31. $a'b + a'c' + abc.$

$a'b(c+c') + a'c'(b+b') + abc.$

$a'bc + a'bc' + a'c'b + a'b'c' + abc$

$abc + a'bc + a'c'b + a'b'c'$

POS: $(a'+b'+c') \cdot (a+b'+c') \cdot (a+c+b') \cdot (a+b+c)$

2.8. $F' = (wx+yz)' = (wx)'(yz)' = (w'+x')(y'+z')$

$FF' = wx(w'+x')(y'+z') + yz(w'+x')(y'+z') = 0.$

$F + F' = wx + yz + (wx+yz)' = A + A' = 1 \quad (A = wx+yz)$

2.9. a) $(xy' + x'y)' = (xy')'(x'y)' = (x'+y)(x+y') = xy + x'y'$

b) $[(a+c)(a+b')(a'+b+c')]' = (a+c)' + (a+b')' + (a'+b+c')' = a'c' + a'b + ab'c.$

c). $[z + z'(v'w + xy)]' = z'[z'(v'w+xy)]' = z'[z'v'w + xyz']'$

$= z'z + z'v + z'w' + z'x' + z'y' + z'z = z'(v + w' + x' + y')$

2.10 a) $F_1 + F_2 = \Sigma m_{1i} + \Sigma m_{2i} = \Sigma(m_{1i} + m_{2i})$

b) $F_1F_2 = \Sigma m_i \Sigma m_j$ where $m_i m_j = 0$ if $i \neq j$ and $m_i m_j = 1$ if $i = j$

2.11 a) $F(x,y,z) = \Sigma(1,4,5,6,7)$

x	y	z	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

b) $F(a,b,c) = \Sigma(0,2,3,7)$

a	b	c	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

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2.12 a) A AND B = 1010_0000

A OR B = 1011_1101

A XOR B = 0001_1101

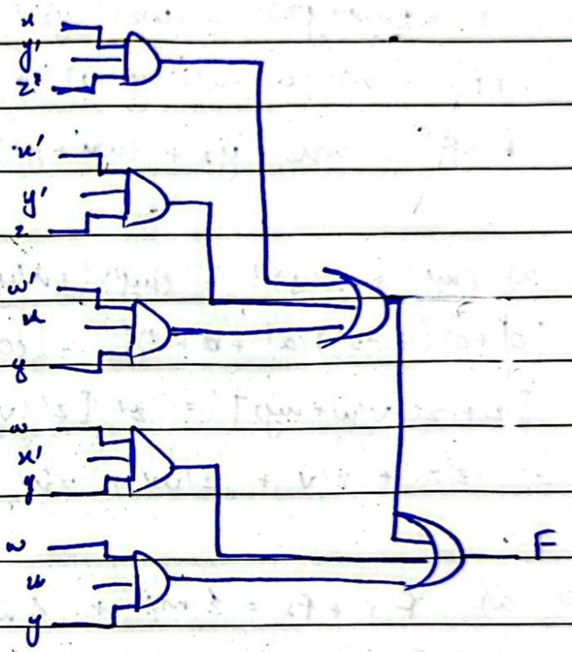
NOT A = 0100_1110

NOT B = 0101_0011.

2.18 a)

w	x	y	z	F
0	0	0	0	0
0	0	0		1
0	0	1		0
0	0	1		0
0	1	0		0
0	1	0		1
0	1	1		1
0	1	1		1
1	0	0		0
1	0	0		1
1	0	1		1
1	0	1		1
1	1	0		0
1	1	0		1
1	1	1		1
1	1	1		1

b)



c) $F = xy'z + x'y'z + w'xy + wx'y + wxy$

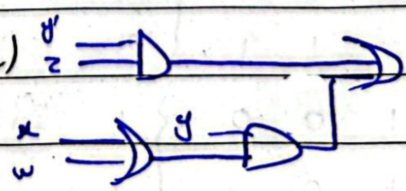
$= yz + xy + wy = y'z + y(w+x)$

d) $y'z + yw + yx = \Sigma(1, 5, 9, 13, 10, 11,$
$13, 15, 6, 7, 14)$

$F = xy'z + x'y'z + w'xy + wx'y + wxy$

$F = \Sigma(1, 5, 6, 7, 9, 10, 11, 13, 14, 15)$

e)



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2.19. $F = B'D + A'D + BD.$

ABCD	ABCD	ABCD
B' D	A' D	B D
0001	0001	0101
0011	0011	0111
1001	0101	1101
1011	0111	1111

$F = \Sigma(1,3,5,7,9,11,13,15)$

$F = \Pi(0,2,4,6,8,10,12,14)$

2.20 $F(A,B,C,D) = \Sigma(2,4,7,10,12,14)$

a) $F'(A,B,C,D) = \Sigma(0,1,3,5,6,8,9,11,13,15)$

b) $F' = \Sigma(3,5,7)$

2.21 a) $F = \Sigma(1,3,5) = \Pi(0,2,4,6,7)$

b) $F(A,B,C,D) = \Pi(3,5,8,11) = \Sigma(0,1,2,4,6,7,9,10)$

X (2.22. a) $(u+xw)(x+u'v) = ux + uu'v + xxw + xu'vw$

$= ux + xw + xwvu' = ux + xw = x(u+w)$.)

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