LAB 2

Question 1

a.

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

A	B	C	ABC	(ABC)'	A'	B'	C'	A'+B'+C'
0	0	0	0	1	1	1	1	1
0	0	1	0	1	1	1	0	1
0	1	0	0	1	1	0	1	1
0	1	1	0	1	1	0	0	1
1	0	0	0	1	0	1	1	1
1	0	1	0	1	0	1	0	1
1	1	0	0	1	0	0	1	1
1	1	1	1	0	0	0	0	0

Columns (ABC)' and A'+B'+C' are identical for all input combinations

b. XOR - when odd number of iputs are 1, output is 1.

A	B	C	$D = A \oplus B \oplus C$
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Question 2

Q. $A + AB$ Distributive

$A(1+B)$ Dominant

$A(1)$ Identity

A

So $A + AB = A$

b.

$AB + AB'$	Distributive
$A(B + B')$	Compliment
$A(1)$	Identity
A	

So $AB + AB' = A$

c.

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

$BC' \cdot AB' + BC' \cdot CD' + A'D \cdot AB' + A'D \cdot CD'$

$C'B \cdot B'A = 0$ $(B \cdot B' = 0)$ compliment

$BC' \cdot CD' = 0$ $(C' \cdot C = 0)$ compliment

$DA' \cdot AB = 0$ $(A' \cdot A = 0)$ compliment

$AD \cdot D'C = 0$ $(D \cdot D' = 0)$ compliment

So $(BC' + A'D) + (AB' + CD') =$

$= 0 + 0 + 0 + 0 = 0$

Question 3

a.

$A'BC + AC$	Distributive
$C(A'B + A)$	Absorption
$C(A + B)$	

So $A'BC + AC = C(A + B)$

b.

$A'B + ABC' + ABC$	Distributive
$B(A' + AC' + AC)$	Distributive
$B(A' + A(C' + C))$	Compliment
$B(A' + A(1))$	Identity
$B(A' + A)$	Complimen
$B(1)$	Identity

So $A'B + ABC' + ABC = B$

C.

$AB + A(CD + CD')$ Distributive

$AB + A(C(D + D'))$ Compliment

$AB + A(C(1))$ Identity

$AB + AC$ Distributive

$A(B + C)$

So $AB + A(CD + CD') = A(B + C)$

Question 4

a.

$(A + B)'(A' + B')' = 0$

$(A + B)' = A' \cdot B'$ DeMorgans

$(A'+B')' = (A')' \cdot (B')'$ DeMorgans

$(A')' = A$ Involution

$(B')' = B$ Involution

$A' \cdot B' \cdot A \cdot B = A' \cdot A \cdot B' \cdot B$

$A \cdot A' = 0$, $B' \cdot B = 0$ Complement

$0 \cdot 0 = 0$

So, $(A+B)'(A'+B')' =$ by deMorgans

b.

$A + A'B + A'B' = 1$

$A + A'(B+B')$

$B+B' = (B \cdot B')'$ DeMorgans

$A + A'(B \cdot B')'$

$A \cdot A'(B \cdot B')' = (A' \cdot (A'(B \cdot B')')')'$ DeMor.

$A + (B \cdot B')$

$(A'(A + B \cdot B'))'$ Distribute

$A'A + B \cdot B' = 0 + 0 = 0' = 1$

So $A + A'B + A'B' = 1$

Question 5

$F = X'Y + XYZ'$

a.

$F' = (X'Y + XYZ')'$

$(X'Y + XYZ')' = (X'Y)' \cdot (XYZ')'$

$(X'Y)' = (X')' + Y' = X + Y$

$(XYZ')' = X' + Y' + (Z')' = X' + Y' + Z$

$F' = (X + Y)(X' + Y' + Z)$

b

$$F \cdot F' = 0$$

$$(X'Y + XYZ') \cdot (X+Y)(X'+Y'+Z)$$

$$(X'Y)\cdot(X+Y) + (X'Y)\cdot(X'+Y'+Z) + (XYZ')$$

$$\cdot(X+Y) + (XYZ')(X'+Y'+Z)$$

$$X' \cdot X = 0$$

$$Y' \cdot Y = 0$$