Victoria University
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MID Term Assessment

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Answer to the question no 1

a) $A + A'B$

$= A + A \cdot B$

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

$= A \cdot (1 + B)$

$= A \cdot (B + 1)$

$= A \cdot 1$

$= A$

b) $A'B' + AB$

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

De morgan's theorem

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

$A'B' = A+B$

we can first apply de morgan theorem.

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

then apply de-morgan theorem.

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

c) $(A+B)(A+C) = A^2 + AC + AB + BC$

Distributivity law

$(A+B)(C+D) = AC + AD + BC + BD.$

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

Then we can expand each of the products in parentheses

$(A+B)(A+C) = A^2 + AC + AB + BC$ Ans.

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

De morgan's theorem states that the component of a sum of the product of the complements and vice versa, therefore the component of the expression is

$A'B'C'D'$ Ans.

e) $(ABCD)' = A'+B'+C'+D'$

De'morgan's theorem.

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

De morgan theorem state that the compoment of a sum is the product of the compoments and vice versa. therefore, the complement of the expression ABCD is the sum of the complements of A, B, C and D.

Answer to the question no 2

a) $(A'B + A'B) + (A'B' + AB)$

Absorption law

$A + A'B = A$

$A + A'B' = A$

Idempotent law

$A + A = A.$

Applying those identities we get.

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

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

$= A + AB$

$= A$

therefore, the simplified form of the function is A

Truth table

A	B	$A'B+A'B$	$A'B'+AB$	$(A'B+A'B)+(A'B'+AB)$	A
0	0	0	0	0	0
0	1	0	1	1	0
1	0	1	0	1	1
1	1	1	1	1	1

b) $A'B'C + A'BC' + AB'C' + ABC$

The function can be simplied using the following boolean algebra

commutatıve law: $A+B = B+A$

Idempotent law: $A + A = A$

Absorption law: $A + A'B = A$

Applying these identities, we get

$A'B'C + A'BC' + AB'C' + ABC$

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

$= A'C(1) + A(C')$

$= A'C + AC'$

Next we can use the distributive law to distribute the C' term over the A and A' terms

$$A'C + AC' = (A'+A)C' = C'$$

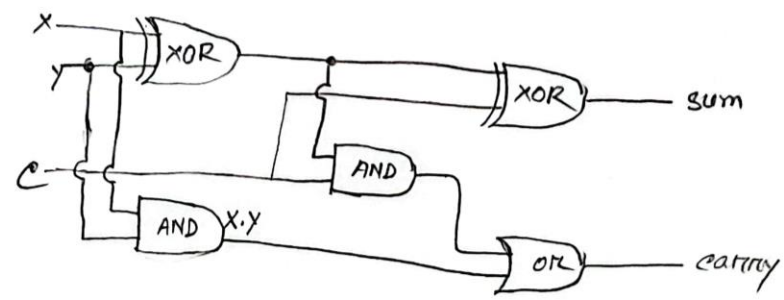
Therefore the simplified form of the function is C'

Truth table

A	B	C	$A'B'C + A'BC' + AB'C' + ABC$	C'
0	0	0	0	1
0	0	1	0	0
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	1
1	1	1	1	0

Answer to the question no 3

a)



Function for

$sum = x'y'c + x'yc' + xy'c' + xyc$

and

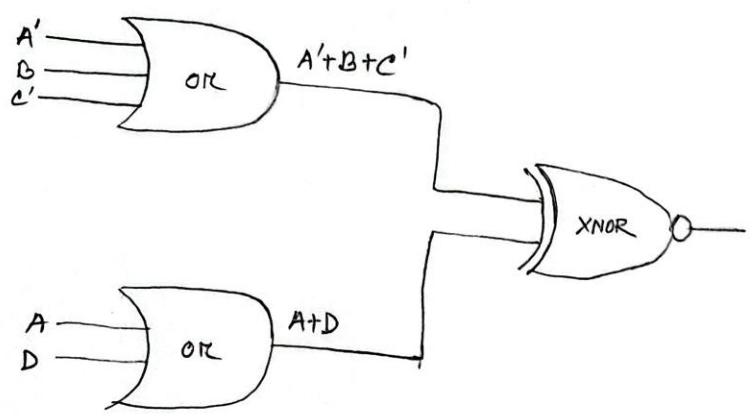
$carry = xy + xc + yc$

Answer to the question NO 3(b)

Answer :-

$$F = (A+B'+C)' \text{ XNOR } (A+D)$$

$$F = A'+B+C' \text{ XNOR } A+D$$



Answer to the question NO 4

Answer:-

Trouth Table

A	B	Cin	sum	cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

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