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MATH 1310 – Technical Math for IT

Sat.	C
Set	_C

ASSIGNMENT 5

Due: Start of the class, Oct 31 (Set B and Set C), Nov 3 (Set A)

This is how I mark this assignment:

50 percent: I scan all the questions to see if they are solved or not. 50 percent: I select a few parts randomly and mark them in detail.

24 marks. Complete all work on separate pages. Work must be clear and complete to receive full marks.

Consider the Boolean expression

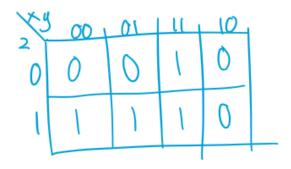
$$F = (x+z)' \oplus (xy')' + (x+y)'z$$

a) [3] Construct the truth table for F, without any simplification

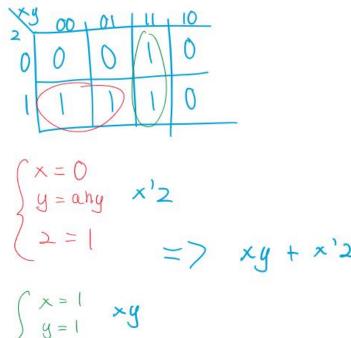
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b) [2] Find canonical SOP and POS forms using the truth table in part a)

c) [2] Create Karnaugh map corresponding to the truth table in part a)



d) [4] Find optimal SOP and POS using the karnaugh map



$$\begin{cases} x = 1 \\ y = 1 \end{cases} \times y$$

$$2 = any$$

$$\begin{cases} x = 0 \\ y = any \\ 2 = 0 \end{cases} = (x+2)(x'+y)$$

$$\begin{cases} x = 0 \\ y = any \\ 2 = 0 \end{cases} (x'+y)$$

$$\begin{cases} x = 1 \\ y = 0 \\ 2 = any \end{cases} (x'+y)$$

e) [6] Starting from original expression, use postulates/theorems of Boolean algebra to reach optimal SOP form you found in section d)

$$(x+2)' \oplus (xy')' + (x+y)' = 2$$

$$(x+2)' = a, (xy')' = 6$$

$$a \oplus b$$

$$ab' + a'b + (x+y)' = 2$$

$$(x+2)'' [(xy')'']' + [(x+2)'']' [(xy')'] + (x+y)' = 2$$

$$(x'2') (xy') + (x+2) (x'+y'') + (x'y') = 2$$

$$(x'2') (xy') + (x+2) (x'+y'') + (x'y') = 2$$

$$(x'2') (xy') + (x+2) (x'+y'') + (x'y') = 2$$

$$(x'2') (xy') + (x+2) (x'+y'') + (x'y') = 2$$

$$(x'2') + (x+2) (x'+y') + x'y' = 2$$

$$(x'2') + 2x' + 2y + x'y' = 2$$

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

f) [4] Starring from optimal SOP form, use postulates/theorems of Boolean algebra to reach optimal POS from

$$xy + 2x'$$

$$xy(1) + 2x'(1)$$

$$xy(1+2) + 2x'(1+y)$$

$$xy + xy^{2} + 2x' + 2x'y$$

$$xy + 2x' + xy^{2} + 2x'y$$

$$xy + 2x' + 2y(x+x')$$

$$xy + 2x' + 2y + 0$$

$$xy + 2x' + 2y + xx'$$

$$xy + 2x' + 2y + xx'$$

$$xx' + xy + 2x' + 2y$$

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

$$L8a$$

$$= (x + 2)(x' + y)$$

g) [2] Construct truth table for optimal SOP and POS form

)4. IF
					-			14*	1 v nt
*	y	2	X	×y	7.2	(X+2)	(x'+y)	77	4
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h) [1] Do they match with the original truth table in part a)? what is the conclusion?

They are equal and match the original truth table: proves that POS and SOP forms are equal eventhough they look different.