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CMPE 240 Experiment 1 Lab Work

Truth Table

#	x2	x1	x0	y
0	0	0	0	0
1	0	0	1	1
2	0	1	0	1
3	0	1	1	1
4	1	0	0	0
5	1	0	1	1
6	1	1	0	0
7	1	1	1	1

Sum of Products (SOP)

$y = x_2'x_1'x_0 + x_2'x_1x_0' + x_2'x_1x_0 + x_2x_1'x_0 + x_2x_1x_0$

Minimized SOP

$y = x_2'x_1'x_0 + x_2'x_1x_0' + x_2'x_1x_0 + x_2x_1'x_0 + x_2x_1x_0$

$= x_2'x_0(x_1'+x_1) + x_2'x_1x_0' + x_2x_1'x_0 + x_2x_1x_0$ **[Distributive]**

$= x_2'x_0 1 + x_2'x_1x_0' + x_2x_1'x_0 + x_2x_1x_0$ **[Complement]**

$= x_2'x_0 + x_2'x_1x_0' + x_2x_1'x_0 + x_2x_1x_0$ **[Identity]**

$= x_2'x_0 + x_2'x_1x_0' + x_2x_0(x_1'+x_1)$ **[Distributive]**

$= x_2'x_0 + x_2'x_1x_0' + x_2x_0 1$ **[Complement]**

$= x_2'x_0 + x_2'x_1x_0' + x_2x_0$ **[Identity]**

$= x_2'(x_0 + x_1x_0') + x_2x_0$ **[Distributive]**

$= x_2'(x_0+x_1)(x_0+x_0') + x_2x_0$ **[Distributive]**

$= x_2'(x_0+x_1)1 + x_2x_0$ **[Complement]**

$= x_2'(x_0+x_1) + x_2x_0$ **[Identity]**

$= x_2'x_0 + x_2'x_1 + x_2x_0$ **[Distributive]**

$= x_0(x_2'+x_2) + x_2'x_1$ **[Distributive]**

$= x_0 1 + x_2'x_1$ **[Complement]**

$= x_0 + x_2'x_1$ **[Identity]**

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Product of Sums (POS)

$y = (x_2+x_1+x_0)(x_2'+x_1+x_0)(x_2'+x_1'+x_0)$

Minimized POS

y	$= (x_2+x_1+x_0)(x_2'+x_1+x_0)(x_2'+x_1'+x_0)$	
	$= (x_2+x_1+x_0)((x_2'+x_0) + x_1x_1')$	[Distributive]
	$= (x_2+x_1+x_0)((x_2'+x_0) + 0)$	[Complement]
	$= (x_2+x_1+x_0)(x_2'+x_0)$	[Identity]
	$= (x_2+x_1)x_2' + x_0$	[Distributive]
	$= (x_2x_2' + x_1x_2') + x_0$	[Distributive]
	$= (0 + x_1x_2') + x_0$	[Complement]
	$= x_1x_2' + x_0$	[Identity]
	$= (x_1+x_0)(x_2'+x_0)$	[Distributive]

Circuit

Circuit of Minimized SOP ($x_0 + x_2'x_1$)