Student Names: Ahmet Emir KOCAAĞA, Mete Han KURT
Student IDs: 2017400276, 2016400339
Group ID:1
Session ID: FF34

CMPE 240 2019 Experiment 2 Preliminary Work

Truth Table

#	r	c	g	p	b
0	0	0	0	0	0
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	0
6	0	1	1	0	1
7	0	1	1	1	1
8	1	0	0	0	0
9	1	0	0	1	0
10	1	0	1	0	1
11	1	0	1	1	0
12	1	1	0	0	1
13	1	1	0	1	0
14	1	1	1	0	1
15	1	1	1	1	1

Sum of Products (SOP)

b = r'cgp' + r'cgp + rc'gp' + rcg'p' + rcgp' + rcgp

Minimized SOP

b = r'cg.(p+p') + rc'gp' + rcg'p' + rcg.(p'+p) (by distributivity)
= r'cg.(1) + rcg.(1) + rc'gp' + rcg'p' (by complement)
= r'cg + rcg + rc'gp' + rcg'p' (by identity)
= cg.(r+r') + rc'gp' + rcg'p' (by distributivity)
= cg.(1) + rc'gp' + rcg'p' (by complement)
= cg + rc'gp' + rcg'p' (by identity)
= cg + rp' (c'g + cg') (by distributivity)
= cg + rp' (c'g + cg'+0+0) (by identity)
= cg + rp' (c'g + cg'+cc'+gg') (by complement)
= cg + rp' (c+g) (c'+g') (by distributivity)
= cg + rp' (c+g) (c.g)' (by DeMorgan's Law)
= cg + rp'(c+g) (by Theorem 9)
=cg + rp'c + rp'g (by distributivity)

Student Names: Ahmet Emir KOCAAĞA, Mete Han KURT
Student IDs: 2017400276, 2016400339
Group ID: 1

Product of Sums (POS)

b = (r+c+g+p)(r+c+g+p')(r+c+g'+p)(r+c+g'+p')(r+c'+g+p)(r+c'+g+p')(r'+c+g+p)(r'+c+g+p')(r'+c+g'+p')(r'+c'+g+p')

Minimized POS

b= (r+c+g+p)(r+c+g+p')(r+c+g+p')(r+c+g+p')(r+c+g'+p)(r+c+g'+p')(r+c+g'+p')(r+c'+g+p)(r+c'+g+p')(r+c'+g+p')(r'+c+g+p)(r'+c+g+p') (r'+c+g+p') (r'+c+g+p') (r'+c+g'+p')(r'+c'+g+p') (by Idempotent Law)

= (r+c+g+p)(r+c+g+p')(r+c+g+p')(r+c+g'+p')(r+c+g+p')(r+c'+g+p')(r+c+g'+p)(r+c+g'+p')(r+c'+g+p)(r+c'+g+p')(r'+c+g+p)(r'+c+g+p')(r'+c+g+p')(r'+c+g'+p') (r'+c+g+p')(r'+c'+g+p') (by commutativity)

= (p+p')(r+c+g)(g+g')(r+c+p')(c+c')(r+g+p')(p+p')(r+c+g')(p+p')(r+c'+g)(p+p')(r'+c+g)(g+g')(r'+c+p')(c+c')(r'+g+p') (by distributivity)

= (1)(r+c+g)(1)(r+c+p')(1)(r+g+p')(1)(r+c+g')(1)(r+c'+g)(1)(r'+c+g)(1)(r'+c+p')(1)(r'+g+p') (by complement)

= (r+c+g)(r+c+p')(r+g+p')(r+c+g')(r+c'+g)(r'+c+g)(r'+c+p')(r'+g+p') (by identity)

= (r+c+g)(r+c+g)(r+c+g)(r+c+p')(r+g+p')(r+c+g')(r+c'+g)(r'+c+g)(r'+c+p')(r'+g+p') (by Idempotent Law)

= (r+c+g)(r+c+g')(r+c+g)(r+c'+g)(r+c+g)(r'+c+g)(r+c+p')(r'+c+p')(r+g+p')(r'+g+p') , (by commutativity)

=(g+g')(r+c)(c+c')(r+g)(r+r')(c+g)(r+r')(c+p')(r+r')(g+p')(by distributivity)

$= (1)(r+c)(1)(r+g)(1)(c+g)(1)(c+p')(1)(g+p')$ (by complement)

$=(r+c)(r+g)(c+g)(c+p')(g+p')$ (by identity)

Circuit