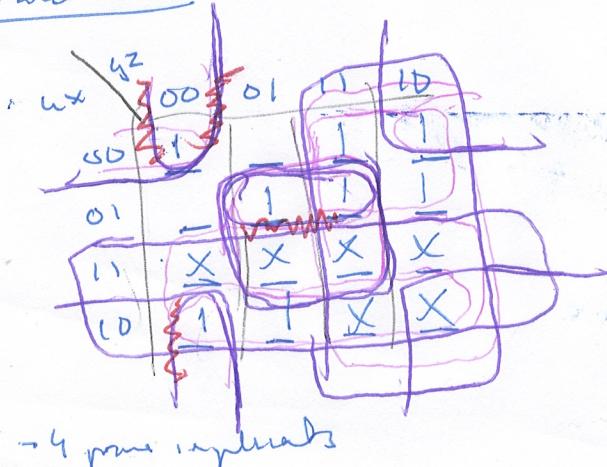


SYSC237D - LAB3 - Exercise 2: PART 2A

- let w, x, y, z be D3, D2, D1, D0

D3	D2	D1	D0	w	x	y	z	S _a	S _b	S _c	S _d	S _e	S _f	S _g
0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
0	0	0	1	0	1	1	0	0	0	0	0	0	0	0
0	0	1	0	1	1	0	1	1	0	1	1	0	1	0
0	0	1	1	1	1	1	1	0	0	0	1	0	0	1
0	1	0	0	0	1	1	0	0	0	1	1	1	1	1
0	1	0	1	1	0	1	1	0	1	1	1	1	1	1
0	1	1	0	1	0	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1	0	1	1	1	1	1	1
1	0	1	1	X	X	X	X	X	X	X	X	X	X	X
1	1	0	0	X	X	X	X	X	X	X	X	X	X	X
1	1	0	1	X	X	X	X	X	X	X	X	X	X	X
1	1	1	0	X	X	X	X	X	X	X	X	X	X	X
1	1	1	1	X	X	X	X	X	X	X	X	X	X	X

Find the S_a

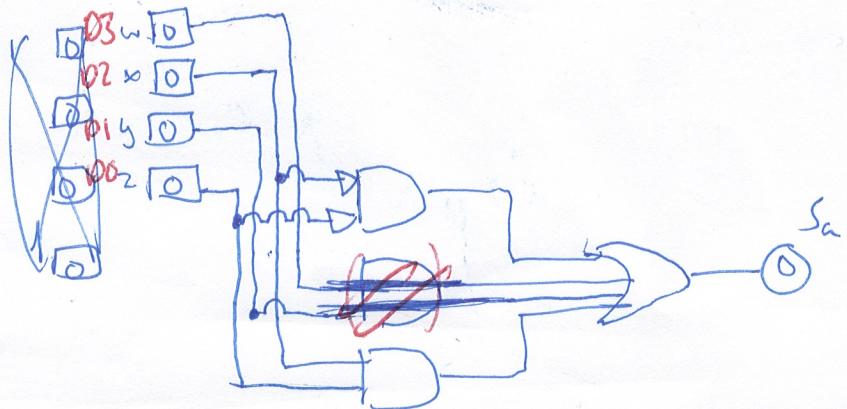


→ 4 prime implicants

Now S_a:

$$S_a(w, x, y, z) = x'z' + w + y + xz$$

$$S_a(D_3, D_2, D_1, D_0) = D_2'D_0D_1 + D_3 + D_1 + D_2D_0$$



Function S_b

wx	yz	00	01	11	10
00	1	1	1	1	1
01	1	0	1	0	1
11	X	X	X	X	X
10	1	1	X	X	X

-> prime implicants

using SOP:

$$S_b(w, x, y, z) = w' + y'z' + yz$$

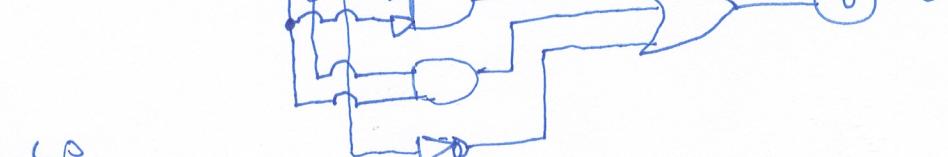
$$S_b(D_3, D_2, D_1, D_0) = D_2' + D_1'D_0' + D_1D_0$$

D₃ w

D₂ x

D₁ y

D₀ z



Function S_c

wx	yz	00	01	11	10
00	1	1	1	1	1
01	1	1	1	1	1
11	X	X	X	X	X
10	1	1	X	X	X

-> prime implicants

using SOP:

$$\Rightarrow S_c(w, x, y, z) = y' + z + x$$

$$S_c(D_3, D_2, D_1, D_0) = D_1' + D_0 + D_2$$

D₃ w

D₂ x

D₁ y

D₀ z

$$S_c(w, x, y, z) = x'z + x'y + yz' + w + xy'z$$

$$S_c(D_3, D_2, D_1, D_0) = D_2'D_0 + D_2'D_1 + D_1D_0' + D_3 + D_2D_1'D_0$$

Function S_d

wx	yz	00	01	11	10
00	1	1	1	1	1
01	1	1	1	1	1
11	X	X	X	X	X
10	1	1	X	X	X

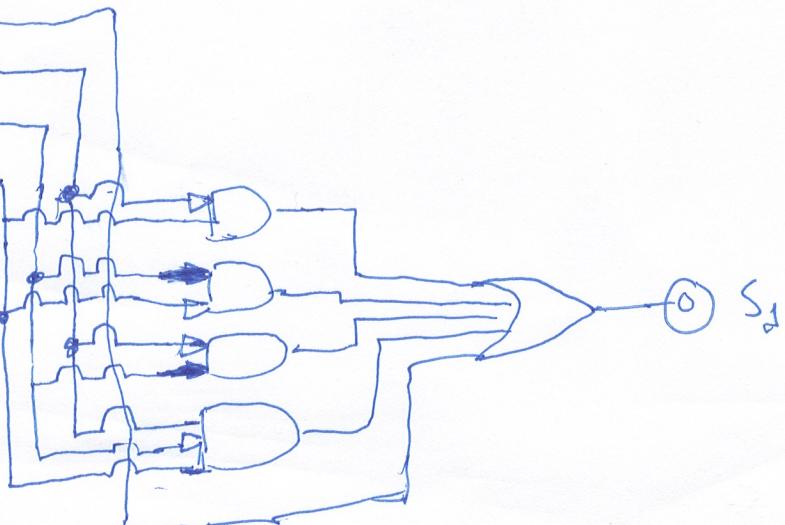
-> prime implicants

D₃ w

D₂ x

D₁ y

D₀ z



Part 2A

page 2

Function S_e

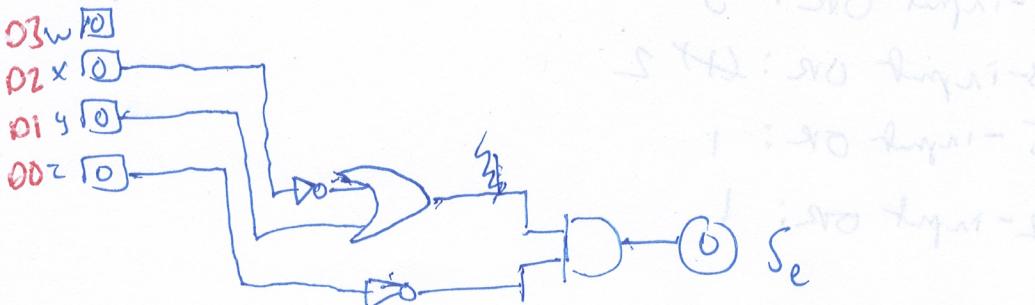
wx	yz	00	01	11	10
00	1	0	0	1	1
01	0	0	0	1	1
11	X	X	X	X	X
10	1	0	X	X	X

- 2 inputs

Using $P_0, S:$

$$S_e(w, x, y, z) = z'(x' + y)$$

$$S_e(D_3, D_2, D_1, D_0) = D_0'(D_2' + D_1)$$



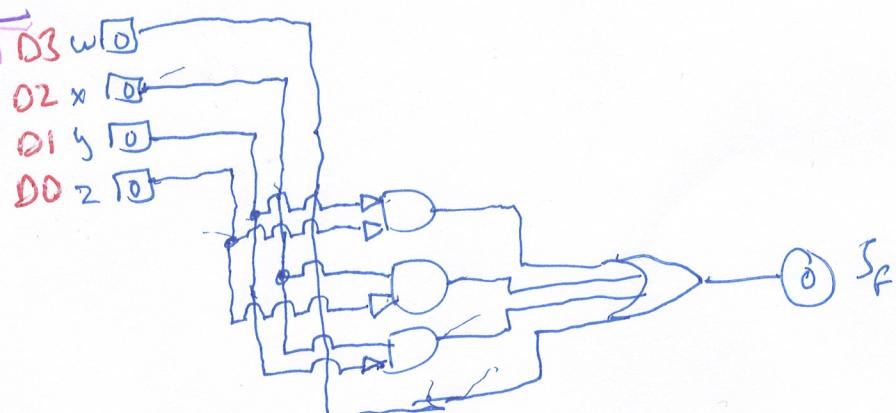
Function S_f

wx	yz	00	01	11	10
00	1	1	1	1	1
01	1	1	1	1	1
11	X	X	X	X	X
10	1	1	X	X	X

- 4 inputs

$$S_f(w, x, y, z) = y'z' + xz' + xy' + w$$

$$S_f(D_3, D_2, D_1, D_0) = D_1'D_0' + D_2D_0' + D_2D_1' + D_3$$



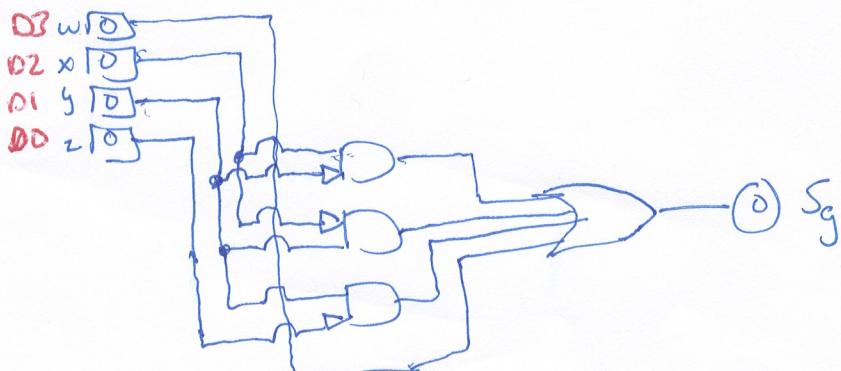
Function S_g

wx	yz	00	01	11	10
00	1	1	1	1	1
01	1	1	1	1	1
11	X	X	X	X	X
10	1	1	X	X	X

- 4 inputs

$$S_g(w, x, y, z) = xy' + w + x'y + yz'$$

$$S_g(D_3, D_2, D_1, D_0) = D_2D_0' + D_3 + D_2'D_1 + D_1D_0'$$



Counting # of gates:

2-input AND: 14

3-input AND: 1

4-input OR: 3

3-input OR: 6+2

5-input OR: 1

2-input OR: 1



2.9 pm

3b worked

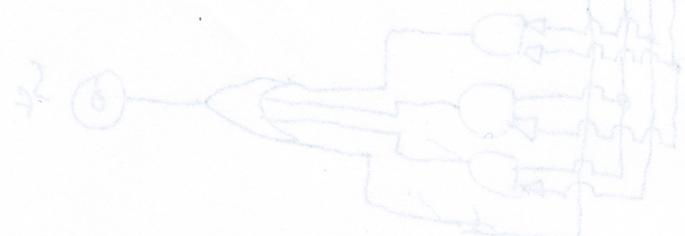
	0	0	1	0
1	0	0	1	0
0	x	x	x	1
1	x	0	1	0
0	x	x	x	1

Strategy

2nd round

$$w + 'wx + 'sx + 's'x = (wxw)_{\text{2}}$$

$$'sa + '1sa + 'sasa + 'sa'a = (0010000000)_{\text{2}}$$



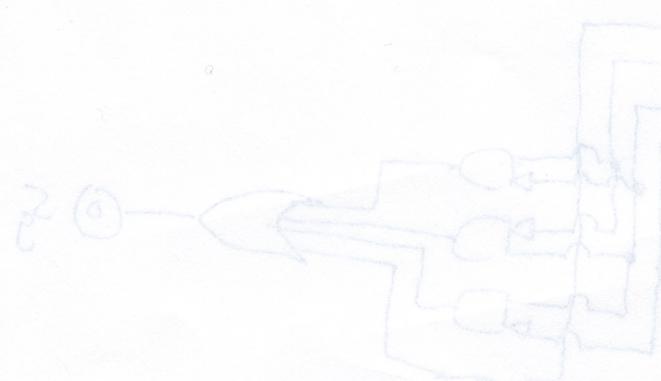
	0	0	1	0	0
1	0	0	1	0	0
0	x	x	x	1	0
1	x	0	1	0	0
0	x	x	x	1	0

Strategy

3rd round

$$w + '5x + '1x + w + '2x = (wxw)_{\text{2}}$$

$$'sa + '1sa + '2sa + '3sa + '4sa = (0010000000)_{\text{2}}$$



	0	0	1	0	0	0
1	0	0	1	0	0	0
0	x	x	x	1	0	0
1	x	0	1	0	0	0
0	x	x	x	1	0	0

Strategy

PART 2

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