VGDS

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Date: / / Sat Sun Mon Tue Thu Wed Fri Subject: 961672

a. ETT2-4) $(x.(x \to y)) \to x$

$\Rightarrow \overline{x.(x \to y)} + x \Rightarrow \overline{(x.(\bar{x}+y))} + x$

$\Rightarrow \overline{(x\bar{x} + xy)} + x \Rightarrow x\bar{y} + x \Rightarrow x + \bar{x} + \bar{y} = 1$

(0) (1)

$\Rightarrow$ always true therefore tautology

ETT3-2)

we have to proove

$(xy + \bar{x}z) \oplus ((x+z) + (\bar{x}+y))$ is satisfiable

~~satisfiable~~ means it should always be 0 for them to be equal

$\Rightarrow (xy + \bar{x}z) \oplus (x + \bar{x} + z + y)$

1

$\Rightarrow$ we know $A \oplus B \Leftrightarrow (A\bar{B}) + (\bar{A}B)$

$\Rightarrow ((xy + \bar{x}z).0) + \overline{(xy + \bar{x}z).1}$

0

$\Rightarrow \overline{(xy + \bar{x}z)} = \overline{(xy)}.(x + \bar{z})$

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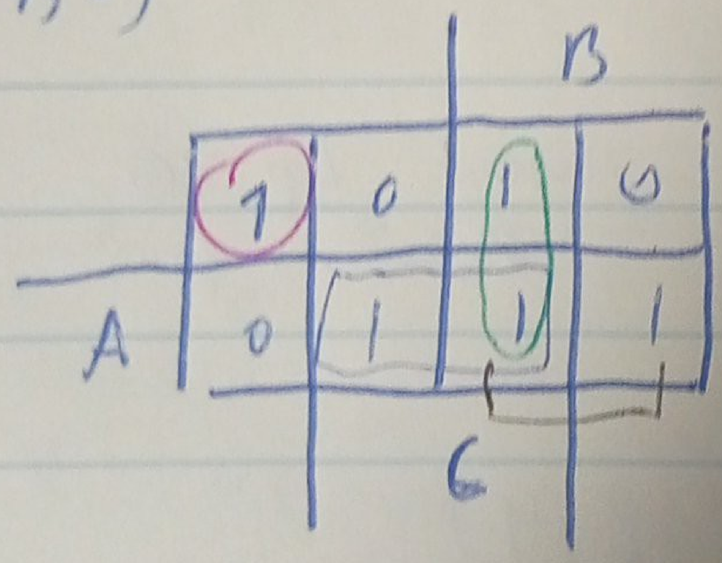
x y z	$\overline{(xy)}$	$x+\bar{z}$	$\overline{(xy)}\cdot(x+\bar{z})$
0 0 0	1	1	1
0 0 1	1	0	0
0 1 0	1	1	1
0 1 1	1	0	0
1 0 0	1	1	1
1 0 1	1	1	1
1 1 0	0	1	0
1 1 1	0	1	0

the result is not always 0

therefor not equivalent

E1T5-2) $f_{(a,b,c)} = \bar{a}bc + a\bar{b}c + ab\bar{c} + abc$
(011) (101) (110) (111)
$+ \bar{a}\bar{b}\bar{c}$
(000)

=> (3, 5, 6, 7, 0)



$\bar{A}\bar{B}\bar{C} + AC + BC + AB$
(BC)

=> $AB + AC + BC + \bar{A}\bar{B}\bar{C}$

$f_{(a,b,c)} = ab + ac + bc + \bar{a}\bar{b}\bar{c}$

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E2T1-3) $H(a,b) = (a \oplus b) \rightarrow a$

$H(a,b)$:

$\Rightarrow ITE(ITE(a, ITE(b,0,1), b), a, 1)$

E2T1-4)

$f(x,y,z) = x \rightarrow (y \rightarrow z)$

$f(x,y,z) = ITE(x, ITE(y,z,1), 1)$

$A \oplus B$:

$ITE(A, \neg B, B)$

↓

$ITE(A, ITE(B,0,1), B)$

$IMPL(A,B)$

↓

$ITE(A,B,1)$

E2T2-2) $f(a,b,c) = \bar{a}b + ab\bar{c} + \bar{a}\bar{b}c$

$= \bar{a} f_{1,0}(0,b,c) + a f_{1,1}(1,b,c)$

$= \bar{a}(b + \bar{b}c) + a(b\bar{c})$

$\times f_{(1,0)} = b + bc = bc + b(1)$

$\times f_{1,1} = b\bar{c} = \bar{b}(0) + b(\bar{c})$

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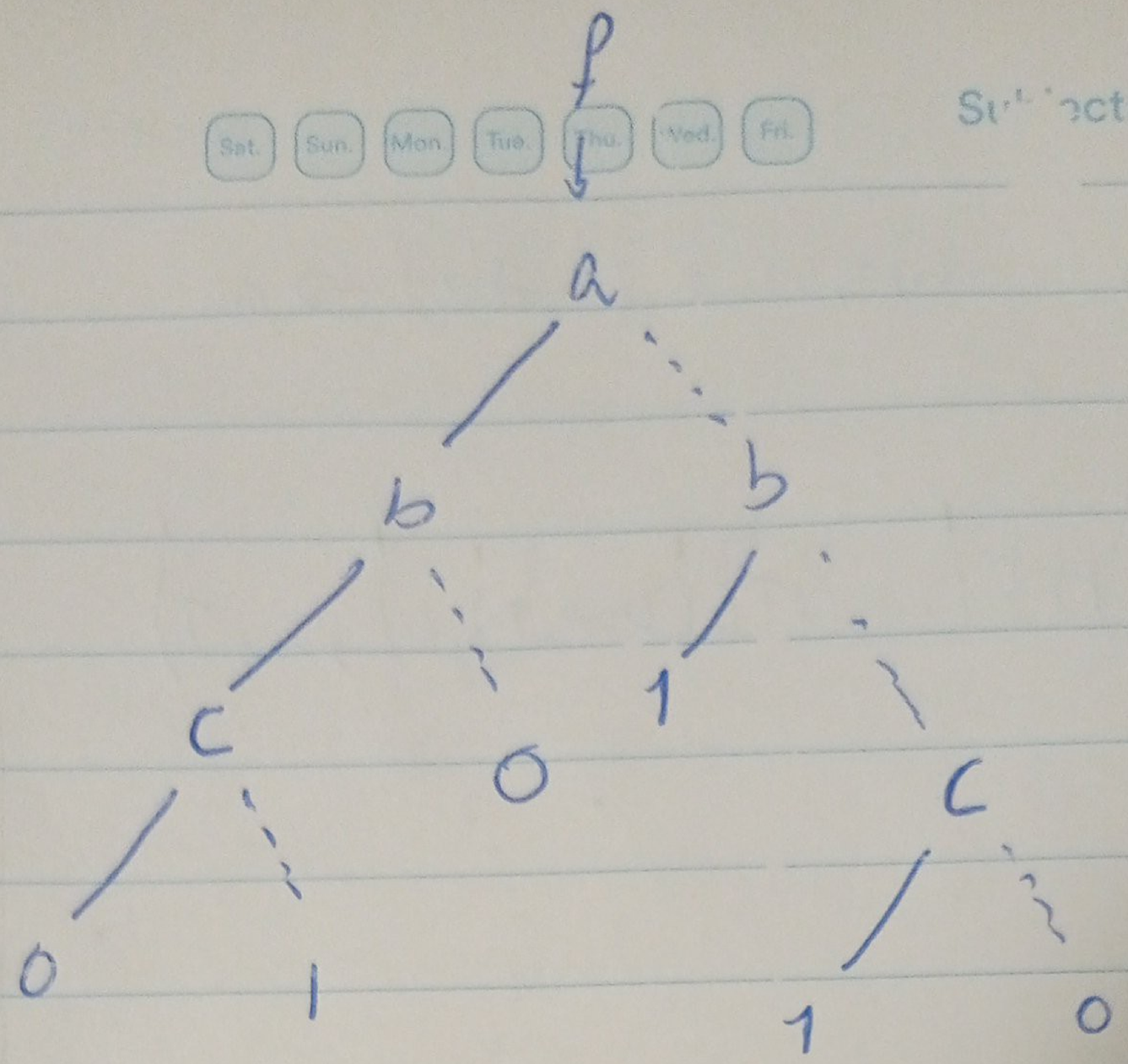

$E_2 T_3 - 2)$

$P(a,b,c,d) = \bar{b}\bar{c}\bar{d} + \bar{a}\bar{c}d + bcd + ac\bar{d}$

$q(a,b,c,d) = \bar{a}\bar{b}\bar{c} + \bar{a}bd + abc + a\bar{b}\bar{d}$

$P(a,b,c,d) = \bar{d}P(a,b,c,0) + dP(a,b,c,1)$

$= \bar{d}(\bar{b}\bar{c} + ac) + d(\bar{a}\bar{c} + bc)$

$\Leftrightarrow \quad \bar{c}(\bar{b}) + c(a) + \bar{c}(\bar{a}) + c(b)$

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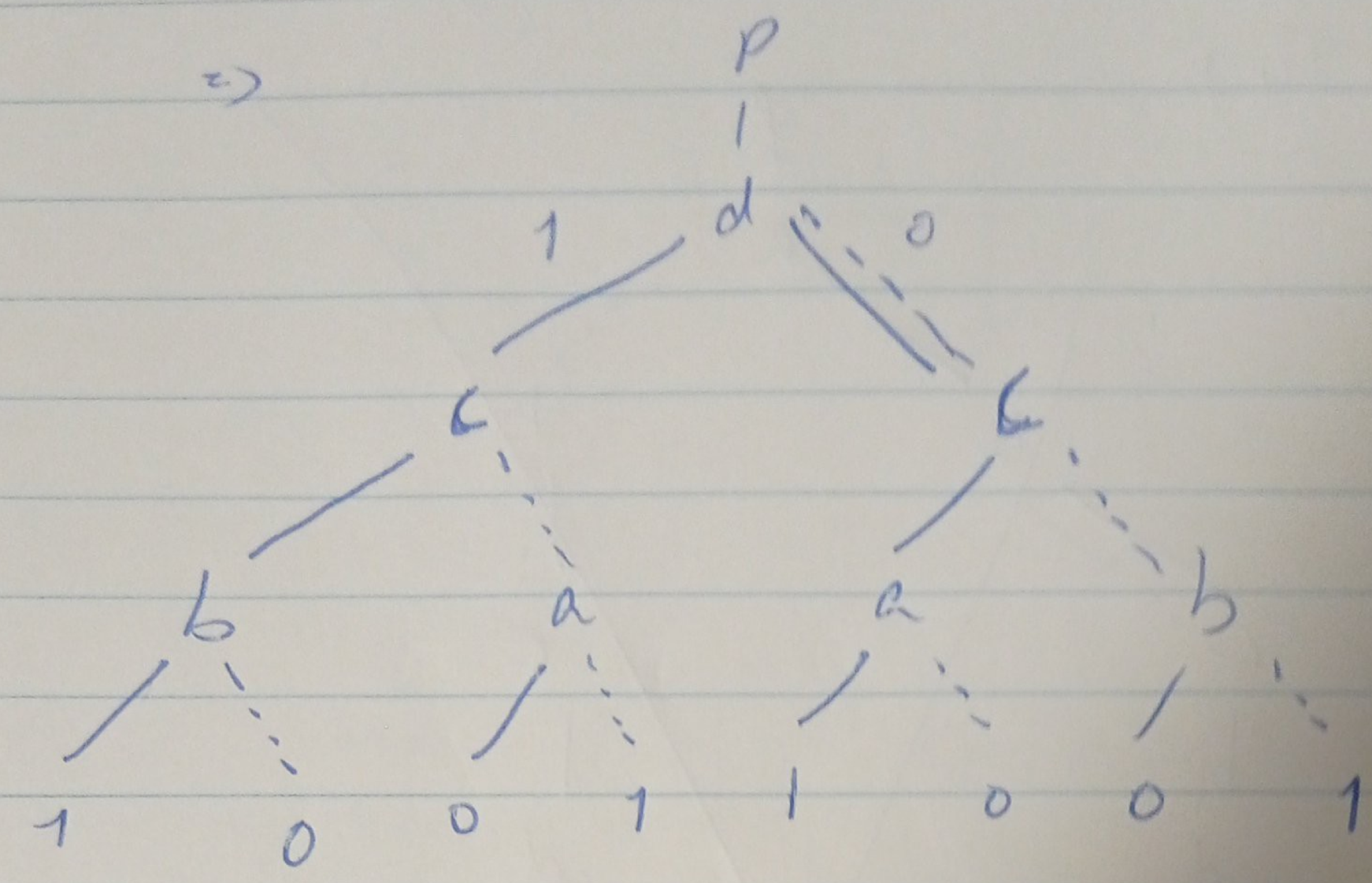
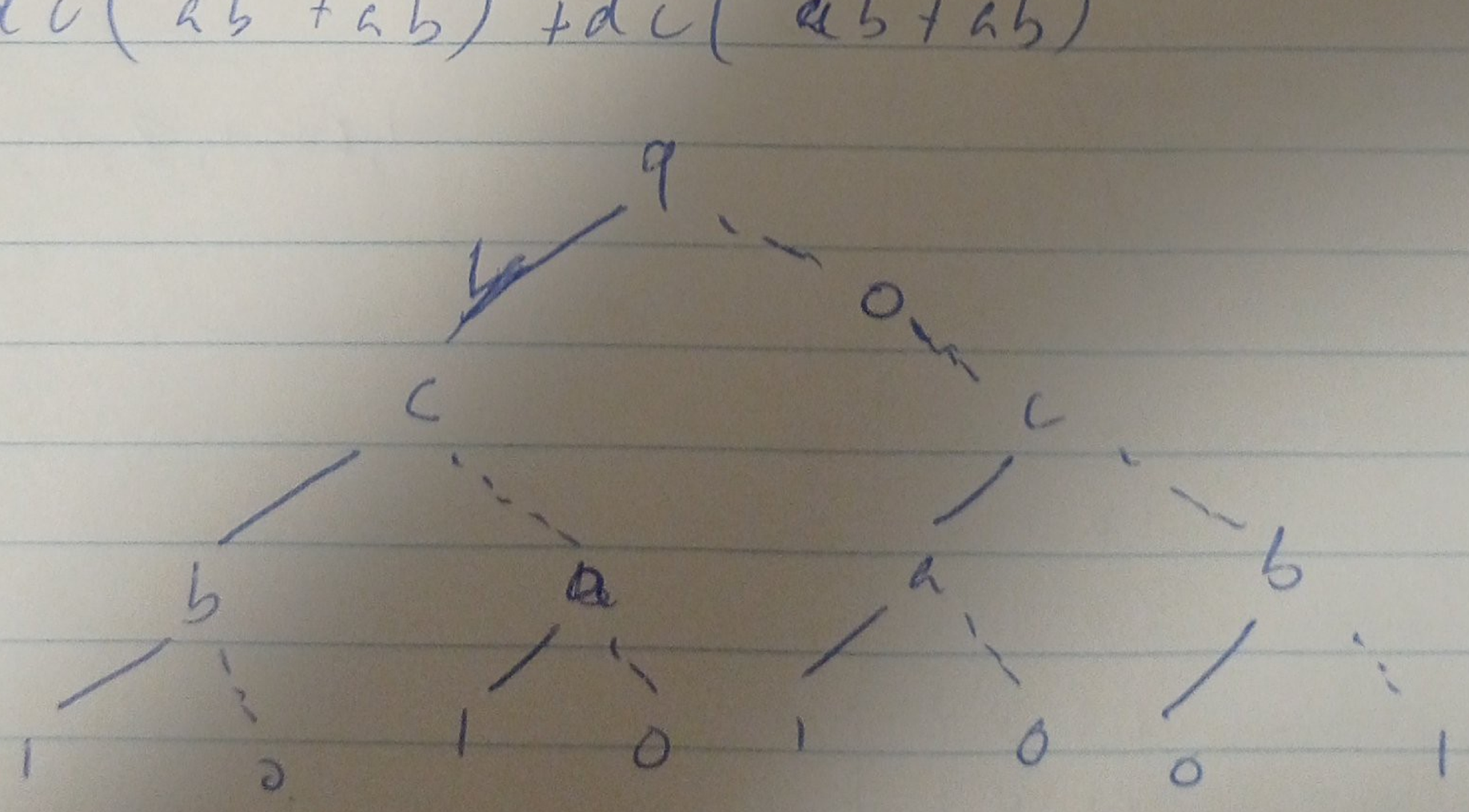


$$q(a,b,c,d) = \bar{d}(\bar{a}\bar{b}\bar{c} + a\bar{b}c + a\bar{b})$$

$$+ d(\bar{a}\bar{b}\bar{c} + \bar{a}b + abc)$$

$$\Leftrightarrow \bar{d}\bar{c}(\overbrace{\bar{a}\bar{b}}^{\bar{b}} + \overbrace{a\bar{b}}^{a}) + \bar{d}c(ab + a\bar{b})$$

$$+ d\bar{c}(\overbrace{\bar{a}\bar{b}}^{\bar{a}} + \bar{a}b) + dc(\overbrace{\bar{a}b}^{b} + ab)$$



the BDD's don't look the same

not equivalent

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E2T4)

abcd	
0000	0
0001	1
0010	1
0011	0
0100	1
0101	0
0110	0
0111	1
1000	1
1001	0
1010	0
1011	1
1100	0
1101	1
1110	1
1111	0

a \ cd	00	01	11	10
00	0	1	0	1
01	1	0	1	0
11	0	1	0	1
10	1	0	1	0

c

b

a

d

$\Rightarrow a \oplus b \oplus c \oplus d$

$f(a,b,c,d) = a \oplus b \oplus c \oplus d$

E3T1-2) $f(a,b,c,d) = 7 \Leftrightarrow abcd$ is fibonacci

0-15 range $\rightarrow$ 0, 1, 2, 3, 5, 8, 13

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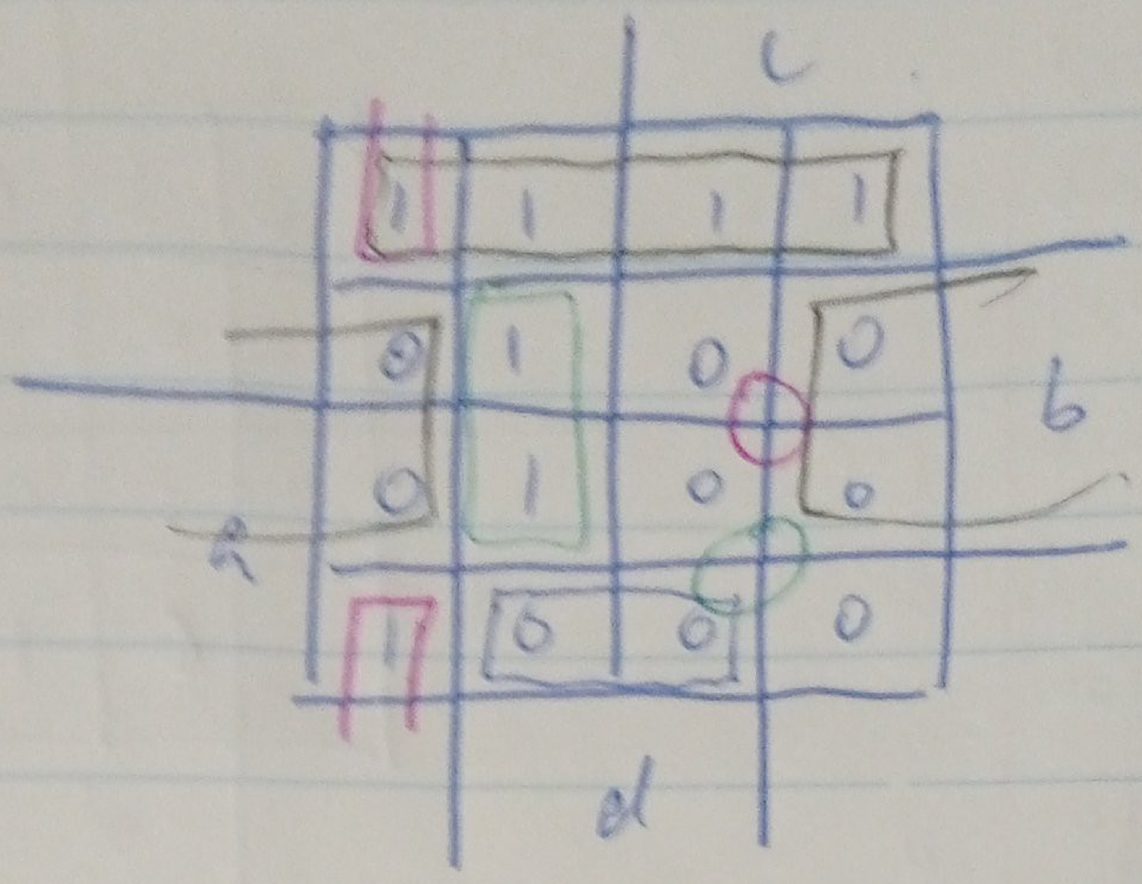
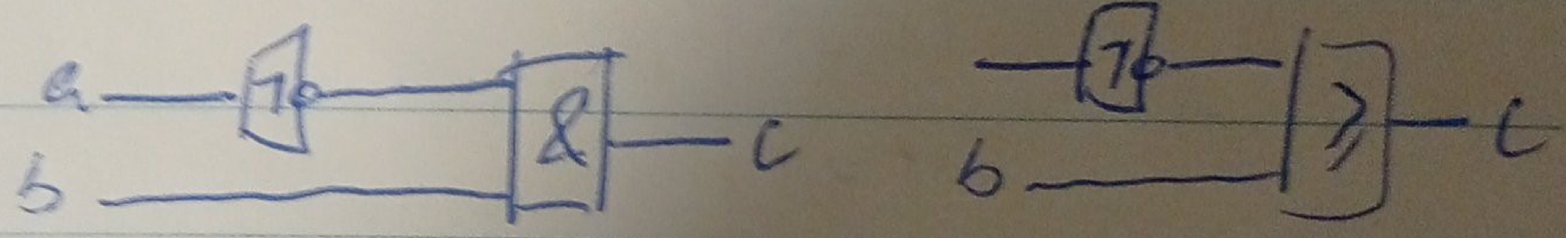
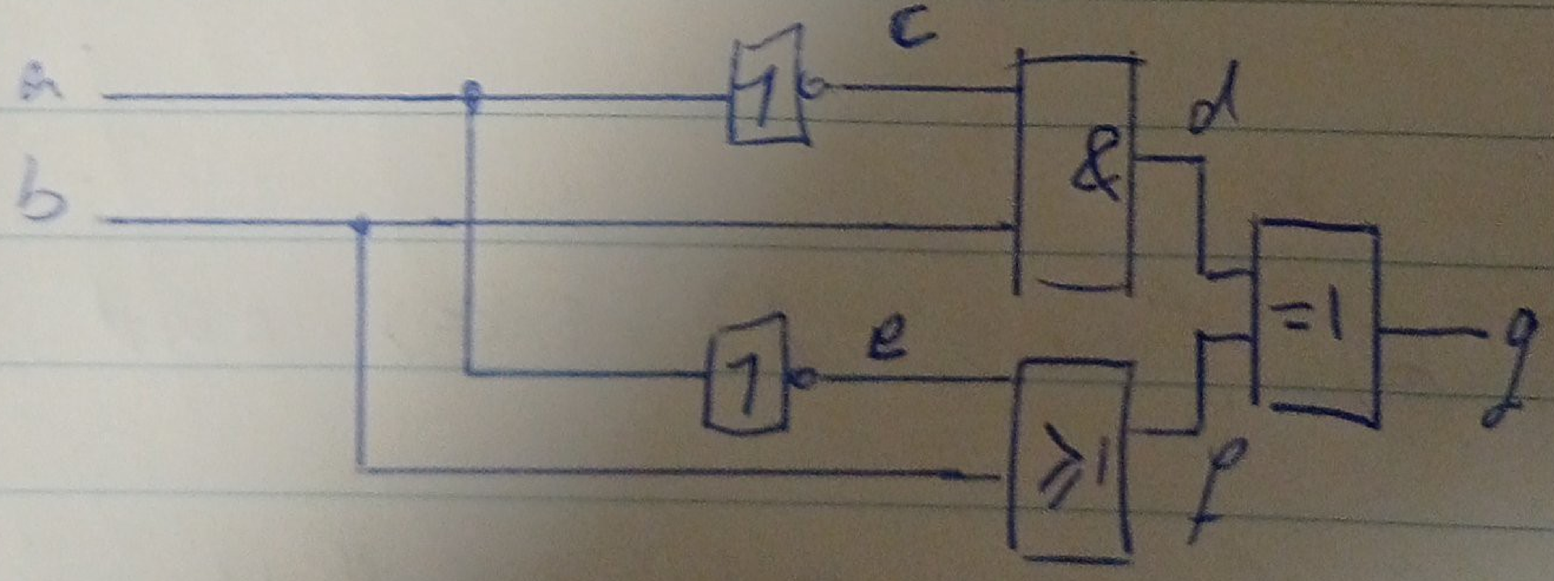


DNF => $\bar{A}\bar{B} + B\bar{C}D + \bar{B}\bar{C}\bar{D}$

CNF => $(\bar{B}+D)(\bar{B}+\bar{C})(\bar{A}+\bar{C})(\bar{A}+B+\bar{D})$

Eg 1 (-2)





$g = (d+f+\bar{g})(\bar{d}+f+g)(d+\bar{f}+g)(\bar{d}+f+\bar{g})$

$(\bar{b}+\bar{c}+d)(c+\bar{d})(b+\bar{d})$

$(\bar{c}+a)(a+c)(e+b+\bar{f})(\bar{e}+f)(b+f)$

$(\bar{e}+\bar{a})(e+a)$

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for not being equal g must be 1

→ g=1

$(d+f)(\bar{d}+\bar{f})(\bar{b}+\bar{c}+d)(c+\bar{d})(b+\bar{d})$

$(\bar{a}+\bar{c})(a+c)(e+b+\bar{f})(\bar{e}+f)(\bar{b}+f)$

$(\bar{a}+\bar{e})(a+e)$

→ between d and f ⇒ f=1

$(\bar{d})(\bar{b}+\bar{c}+d)(c+\bar{d})(b+\bar{d})(\bar{a}+\bar{c})(a+c)(e+b)$

$(\bar{a}+\bar{e})(a+e)$

→ d=0

$(\bar{b}+\bar{c})(\bar{a}+\bar{c})(a+c)(e+b)(\bar{a}+\bar{e})(a+e)$

→ e=1

$(\bar{b}+\bar{c})(\bar{a}+\bar{c})(a+c)(\bar{a})$

→ a=0

$(\bar{b}+\bar{c})(c)$

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→ $c = 1$

$\bar{b} = 1 \Rightarrow b = 0$

for $a = 0$ and $b = 0$ the results

are not equal therefor not equivelent

$E_4 T_3 - 5$)

whenever the washing machine door is

closed and blocked, there is a possibility

that in the future, it will not be closed.

*) it doesn't mean open, cause the door

can also be blocked

(E 4 I 2)

liveness : sometime later

safety : it must happen or never happen

3. when the machine is washing, washing will be imply Always

finished at a later time.

F

it is always the case

AG

=) AG(washing => AF washing) liveness

6. when the door is not blocked, it is possible imply E

that the machine will be washing at the next Always

time step.

X

=) AG(blocked => EX washing) liveness

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7. it is possible that the machine will be

washing at some time.

a) EF

liveness

the end