
Exercise 1.

Let us consider the following logic functions

$$f(a,b,c,d) = a.b + \overline{a}.\overline{c}.\overline{d} \text{ and } g(a,b,c,d) = (\overline{a} + \overline{b} + \overline{c}).(a+d).$$

— *Give a logic circuit based on 2-input NAND gates and a logic circuit based on 2-input NOR gates for each of these functions.*

Exercise 2.

We define a logical function f by the following truth table.

1. *Write the disjonctif canonical form of the output.*
2. *Using theorems and laws of Boolean algebra to simplify the logical expression.*
3. *Give a logic circuit, using only 2-input NAND gates to implement the function f.*

a	b	c	$f(a,b,c)$
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

Exercise 3.

1. *Write minterm and maxterm Boolean functions expressed by*

$$f(a,b,c) = \prod(0,3,7)$$

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2. *Let us define the Boolean function g by $g(a,b,c) = a.b + \overline{c}$.*
   — *Write minterm and maxterm expressions of f.*
3. *Simplify the Boolean functions f and g using the Karnaugh mapping method*
4. *Using the Karnaugh mapping method, simplify the Boolean function h, defined by $h(a,b,c,d) = \sum(1,2,5,8,9,11,15) + \sum_{\varphi}(0,3,10,14)$.*

Exercise 4.

c \ ab	00	01	11	10
0	1	1	1	1
1	1	0	0	1

c \ ab	00	01	11	10
0	1	x	1	x
1	1	0	1	1

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

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

cd \ ab	00	01	11	10
00	1	1	0	1
01	0	0	x	0
11	1	x	0	1
10	1	1	x	1

cd \ ab	00	01	11	10
00	x	0	0	1
01	1	0	0	1
11	x	0	0	0
10	1	1	x	1