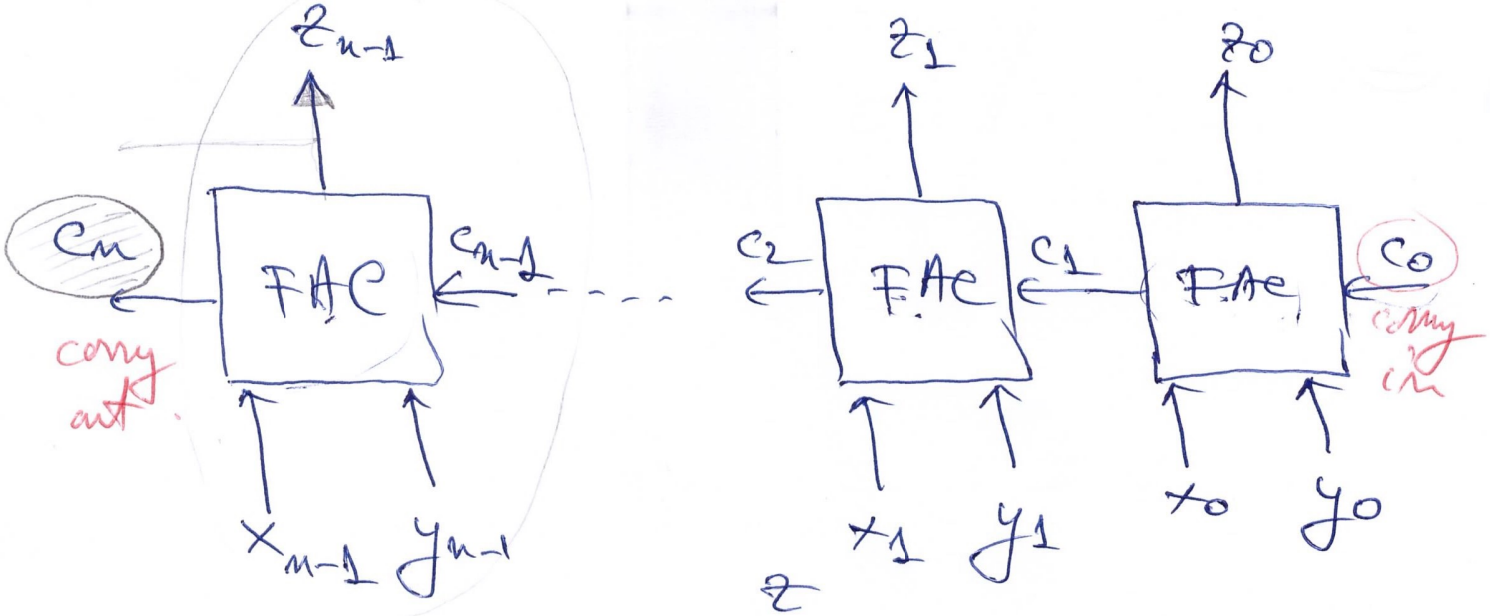
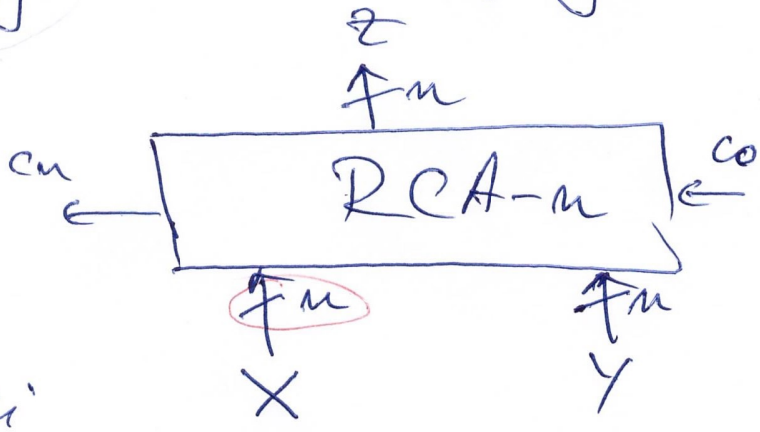
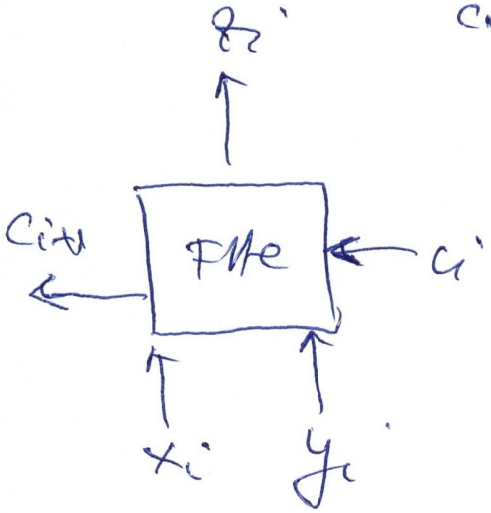
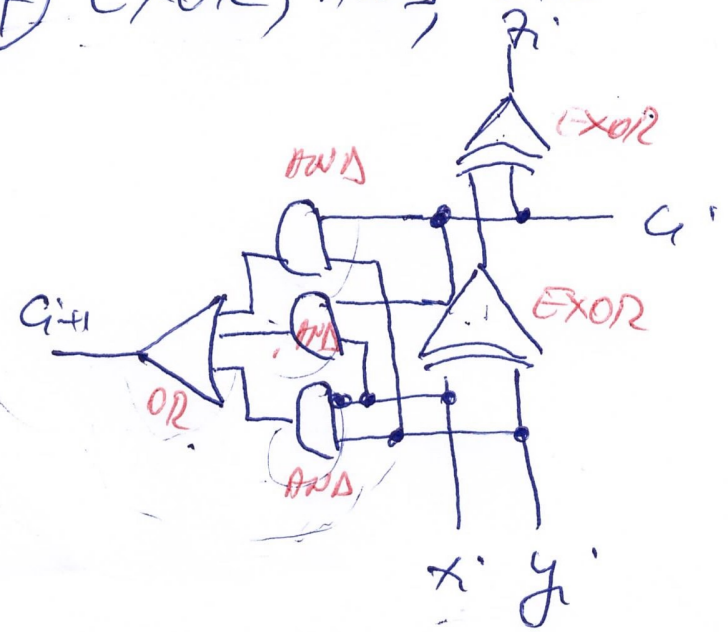
RCA n bits







(A) EXOR, AND, OR

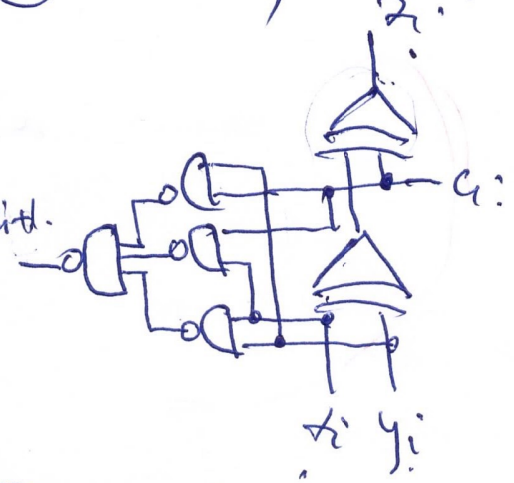


inputs			Outputs	
x_i	y_i	c_i	z_i	c_{i+1}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

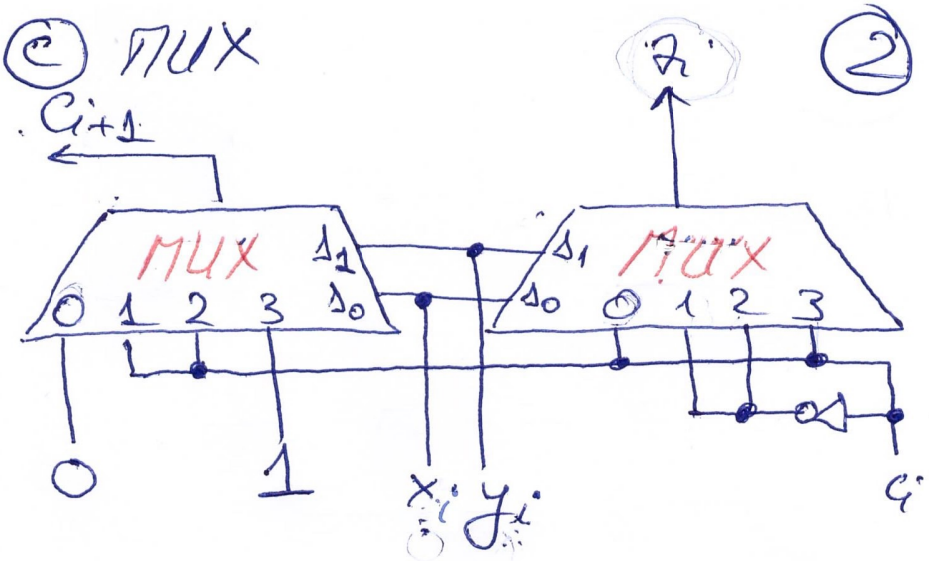
$$z_i = x_i \oplus y_i \oplus c_i$$
$$c_{i+1} = x_i \cdot y_i + x_i \cdot c_i + y_i \cdot c_i$$

} FAc:

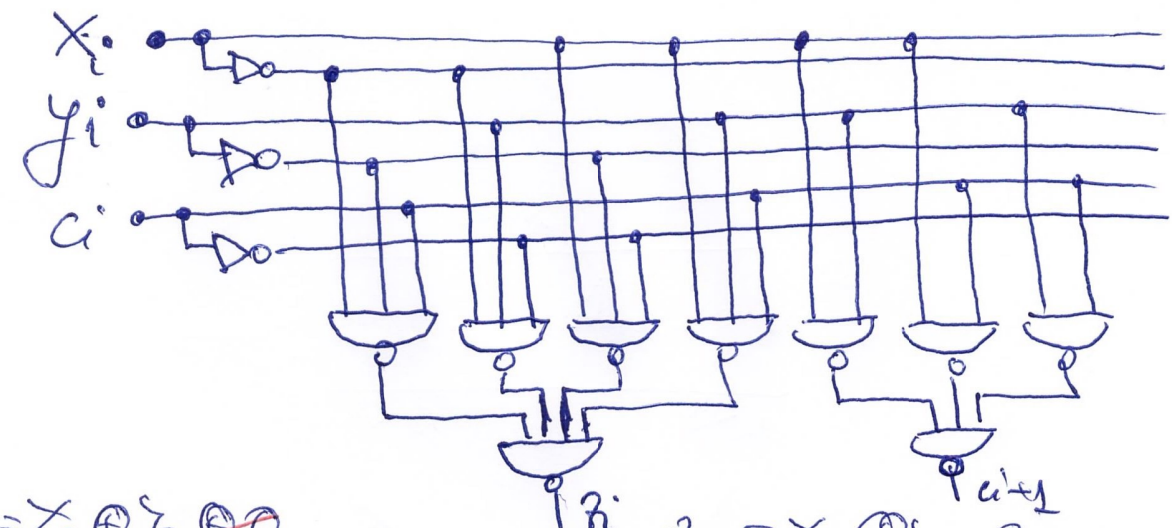
(B) EXOR, NAND



(C) MUX

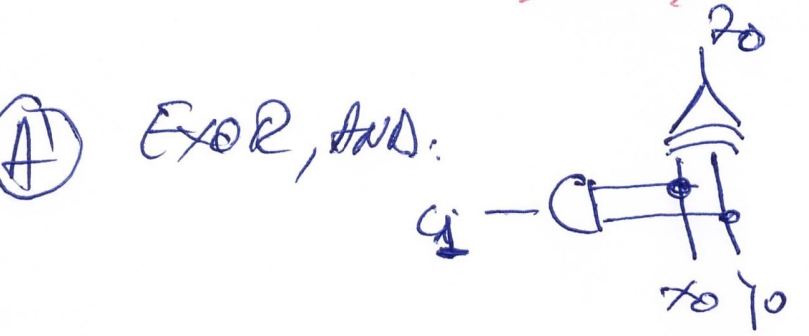


(D) NAND



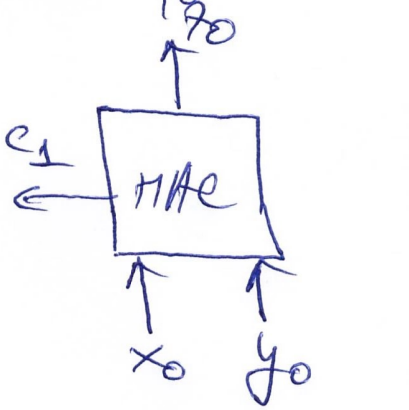
$c_0 = 0$ $z_0 = x_0 \oplus y_0 \oplus 0$

$c_1 = x_0 \cdot y_0 + x_0 \cdot 0 + y_0 \cdot 0$



$z_0 = x_0 \oplus y_0$ } HAc

$c_1 = x_0 \cdot y_0$



(A) EXOR, AND:

(B) NOR:

$$z_0 = x_0 \oplus y_0 = x_0 \cdot \overline{y_0} + \overline{x_0} \cdot y_0 =$$

$x_0 \cdot \overline{x_0} = 0$

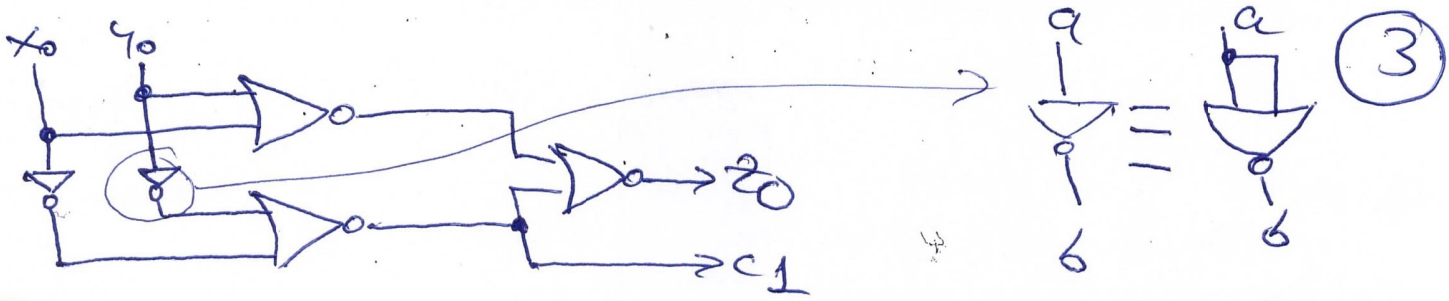
$\overline{a \cdot b} = \overline{a} + \overline{b}$

$$= x_0 \cdot (\overline{x_0} + \overline{y_0}) + y_0 \cdot (\overline{x_0} + \overline{y_0}) =$$

$$= (x_0 + y_0) \cdot (\overline{x_0} + \overline{y_0})$$

$$= \overline{x_0 + y_0} + \overline{\overline{x_0} + \overline{y_0}}$$

$$c_1 = \overline{\overline{x_0 \cdot y_0}} = \overline{x_0} + \overline{y_0}$$



(3)

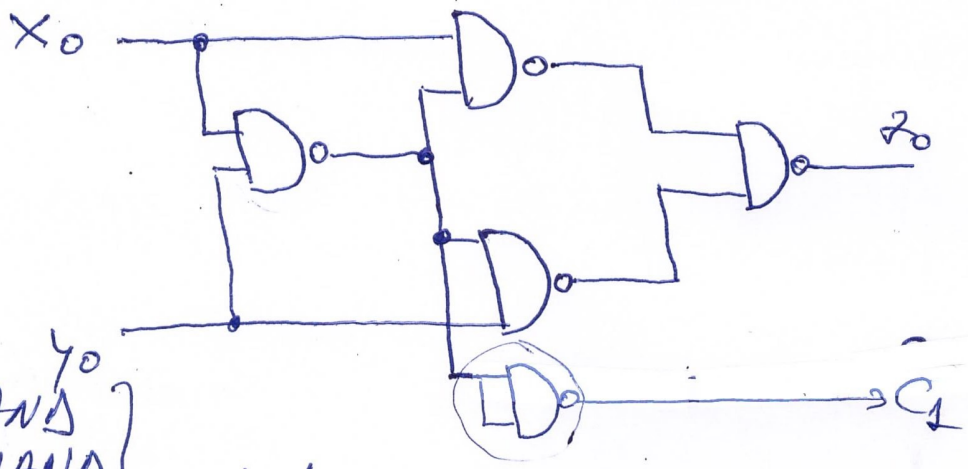
(c) NAND

$$z_0 = x_0(\overline{x_0}+\overline{y_0}) + y_0(\overline{x_0}+\overline{y_0})$$

$$= \overline{x_0 \cdot \overline{x_0 \cdot y_0}} \cdot \overline{y_0 \cdot \overline{x_0 \cdot y_0}}$$

$\overline{a+b} = \overline{a} \cdot \overline{b}$

$$c_1 = \overline{x_0 \cdot y_0}$$

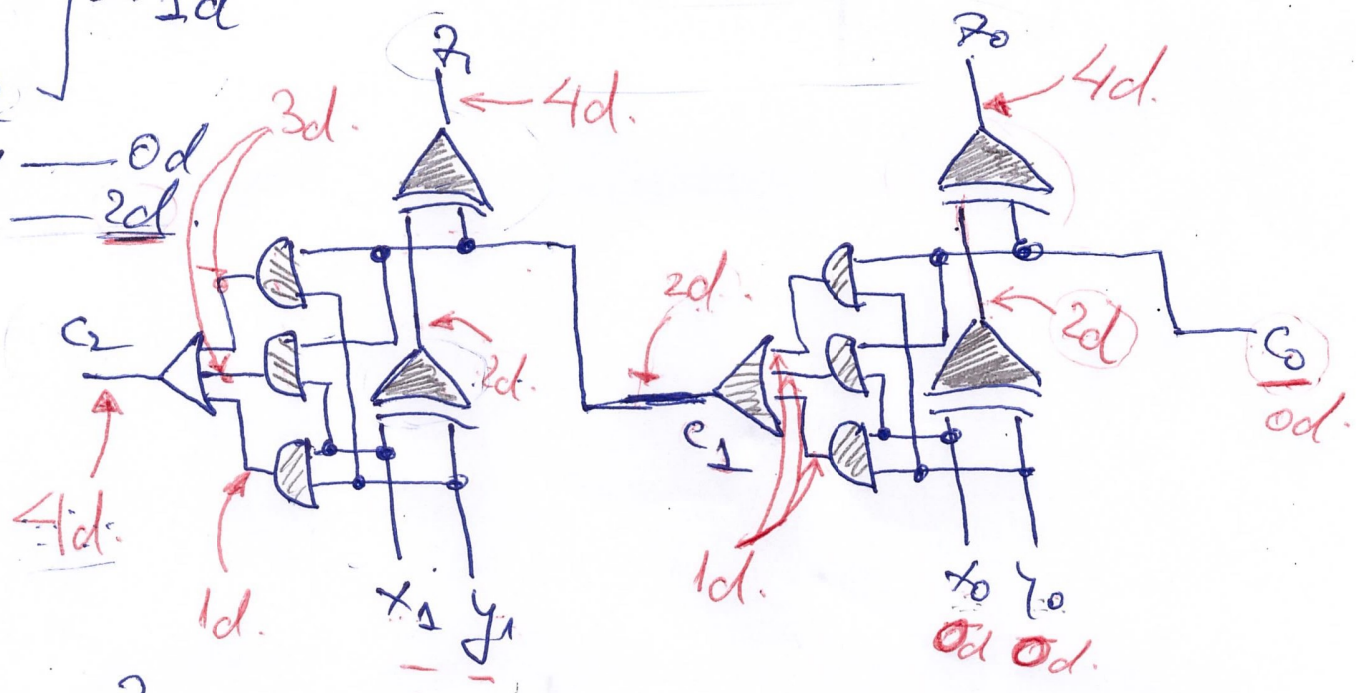


$a \oplus b = (a \cdot \overline{b}) + (\overline{a} \cdot b)$

AND
NAND
OR
NOR
} — 1d

INV — 0d

EXOR — 2d



$$D_{RCA}^{z} = 2n\,d$$

$$D_{RCA}^{cout} = 2n\,d.$$

Exemple $n = 1$

$D_{RCA}^{z} = 4d.$

$D_{RCA}^{cout} = 2d.$