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1) Decimal a binario

$$10 \rightarrow \begin{array}{r} 1010 \\ 1010 \\ -\underline{1010} \\ \hline 0000 \end{array} \quad 1010_{(2)} = 10_{(10)}$$

$$01369 \rightarrow \underline{1369}_2$$

$$\begin{array}{r} 1684 \\ 0342 \\ \hline 01171 \end{array}$$

$$\begin{array}{r} 1185 \\ 1142 \\ \hline 021 \end{array}$$

$$\begin{array}{r} 110 \\ 052 \\ \hline 120 \end{array}$$

$$10101011001_{(2)} = 1369_{(10)}$$

$$\begin{array}{r}
 09234876 \\
 923487612 \\
 01461743812 \\
 01230871912 \\
 1115435912 \\
 1157717912 \\
 1128858912 \\
 114429912 \\
 017214312 \\
 1136073 \\
 111803612 \\
 01901812 \\
 01450912 \\
 11225412 \\
 ,0112712 \\
 11156312 \\
 1128112 \\
 1114012 \\
 0170122 \\
 013512 \\
 -111712 \\
 11812 \\
 01412 \\
 01212 \\
 01112 \\
 \hline
 (9234876_{10}) = 1000110011010011011100_2
 \end{array}$$

$$\begin{array}{r}
 049263749_2 \\
 124631874_2 \\
 012315937_2 \\
 1 \boxed{6} 157968_2 \\
 013078984_2 \\
 011539492_2 \\
 01764746_2 \\
 01384873_2 \\
 1192436_2 \\
 0198218_2 \\
 0148109_2 \\
 124054_2 \\
 +0112027_2 \\
 121603_2 \\
 113006_2 \\
 -01503_2 \\
 1175_2 \\
 11375_2 \\
 11187_2 \\
 1193_2 \\
 1146_2 \\
 -0123_2 \\
 111_2 \\
 110_2 \\
 112_2 \\
 01_2
 \end{array}$$

$$49263749_{(10)} = 101110111101101001000001_2$$

Complemento de 2

$$0(-20)_{10} \rightarrow (20)_6 \rightarrow 10100_2 \rightsquigarrow 010100 \text{ ; con complemento}$$

$$\begin{array}{r}
 11111 \\
 101011 \\
 \hline
 101100
 \end{array}
 \quad
 \begin{array}{r}
 00010100 \\
 11101011 \\
 \hline
 11101100
 \end{array}$$

$$(-20)_{10} = 101100_2$$

$$\begin{array}{r}
 0-1025 \\
 1025_{(10)} \rightarrow \boxed{1}_2 \\
 0152_2 \\
 01256_2 \\
 01281_2 \\
 0164_2 \\
 032_2 \\
 016_2 \\
 08_2 \\
 04_2 \\
 02_2 \\
 01_2
 \end{array}
 \quad
 \begin{array}{r}
 \rightarrow 010000000001 \\
 \downarrow \quad \downarrow \\
 10111111110 \\
 +1 \\
 10111111111
 \end{array}
 \quad
 -(-1025)_2 = 1011111111_2$$

- 3925

$$\rightarrow 0111101010101 \\ 1000010101010 \\ \hline 1000010101011$$

$$-3925 \rightarrow 1000010101011_{(2)}$$

$$3925 \begin{array}{|c} \hline 2 \\ \hline 11962 \\ \hline 01981 \\ \hline \end{array}$$

$$11490 \begin{array}{|c} \hline 2 \\ \hline 0245 \\ \hline 1122 \\ \hline 0161 \\ \hline 130 \\ \hline 0115 \\ \hline 117 \\ \hline 113 \\ \hline 111 \\ \hline \end{array}$$

o - 104596

$$\rightarrow 011001100010010100$$

$$-104596_{(10)} \rightarrow 10011001101101100_{(2)}$$

$$104596 \begin{array}{|c} \hline 2 \\ \hline 0152298 \\ \hline \end{array}$$

$$026149 \begin{array}{|c} \hline 2 \\ \hline 11307418 \\ \hline 016537 \\ \hline 132681 \\ \hline 011634 \\ \hline 01817 \\ \hline 11468 \\ \hline 01204 \\ \hline 0102 \\ \hline 0151 \\ \hline 0125 \\ \hline 112 \\ \hline 016 \\ \hline 013 \\ \hline 111 \\ \hline \end{array}$$

Binary to Hex

$$1 \times 2^{30} \rightarrow 1,09 \times 10^{12}$$

$$1 \times 2^{29} \rightarrow 5.49 \times 10^{11}$$

$$0 \times 2^{28}$$

$$0 \times 2^{27}$$

$$1 \times 2^{26} \rightarrow$$

$$1 \times 2^{25} \rightarrow$$

$$1 \times 2^{24} \rightarrow$$

$$1 \times 2^{23} \rightarrow$$

$$0 \times 2^{22}$$

$$1 \times 2^{21} \rightarrow$$

$$0 \times 2^{20}$$

$$1 \times 2^{19} \rightarrow$$

$$0 \times 2^{18} \rightarrow$$

$$1 \times 2^{17} \rightarrow$$

$$0 \times 2^{16} \rightarrow$$

$$1 \times 2^{15} \rightarrow$$

$$1 \times 2^{14} \rightarrow$$

$$0 \times 2^{13} \rightarrow$$

$$1 \times 2^{12} \rightarrow$$

$$1 \times 2^{11} \rightarrow$$

$$1 \times 2^{10} \rightarrow$$

$$0 \times 2^9 \rightarrow$$

$$1 \times 2^8 \rightarrow$$

$$1 \times 2^7 \rightarrow$$

$$0 \times 2^6 \rightarrow$$

$$1 \times 2^5 \rightarrow$$

$$1 \times 2^4 \rightarrow$$

$$1 \times 2^3 \rightarrow$$

$$0 \times 2^2 \rightarrow$$

$$1 \times 2^1 \rightarrow$$

$$0 \times 2^0 \rightarrow$$

$$= 2^{36} + 2^{35} + 2^{34} + 2^{33} + 2^{32} + 2^{31} + 2^{30} + 2^{29} + 2^{28} + 2^{27} + 2^{26} + 2^{25} + 2^{24} + 2^{23} + 2^{22} + 2^{21}$$

$$+ 2^{19} + 2^{18} + 2^{17} + 2^{16} + 2^{15} + 2^{14} + 2^{13} + 2^{12} + 2^{11} + 2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$$

$$1 \times 2^{32} \rightarrow$$

$$0 \times 2^{31} \rightarrow$$

$$= 89\ 050\ 83\ 35145\ 16$$

$$9\ 55656770946\ 16$$

$$2\ 13478548184\ 16$$

$$8121740926$$

$$1 \times 2^{16} \rightarrow$$

$$219469261\ 16$$

$$13113588078\ 16$$

$$141849284\ 16$$

$$6\ 530781\ 16$$

$$613317\ 16$$

$$51207\ 16$$

$$1511\ 16$$

$$1210$$

Short method

$$1100$$

$$\underline{C}$$

$$1111$$

$$\underline{F}$$

$$0101$$

$$\underline{5}$$

$$0110$$

$$\underline{6}$$

$$0110$$

$$\underline{6}$$

$$1110$$

$$\underline{E}$$

$$1101$$

$$\underline{0}$$

$$0010$$

$$\underline{2}$$

$$1001$$

$$\underline{9}$$

$$\Rightarrow$$

$$(CF566ED29)_{16}$$

$$0 \times 2^9 \rightarrow$$

$$0 \times 2^8 \rightarrow$$

$$0 \times 2^7 \rightarrow$$

$$0 \times 2^6 \rightarrow$$

$$1 \times 2^5 \rightarrow 32$$

$$0 \times 2^4 \rightarrow$$

$$1 \times 2^3 \rightarrow 8$$

$$0 \times 2^2 \rightarrow$$

$$0 \times 2^1 \rightarrow$$

$$1 \times 2^0$$

101010001010101010101010101011111000000

$$2^9 + 2^8 + 2^3 + 2^1 + 2^0 + 2^{10} + 2^{11} + 2^{12} + 2^{13} + 2^{14}$$

$$+ 2^3 + 2^2 + 2^1 + 2^0 = 698648018880$$

698648018880116

0 43665501180116

12 | 2724093823116

15 | 170768363116

11 | 10660522116

10 6662821

666282116

10141642116

10 | 2602116

10 | 162116

2 | 10116
10 | 0

= A2A AAA BFC0

Short method

1010 0010 1010 1010 1010 1010 1011 1111 1100 0000

A A A A A A B F C O

= A2A AAA BFC0₁₆

Signed to octal

0 111100000111100000001110101011

0000001110000011111000101000

0000000111100000111110001010101

= 11010101010101010101010101010101

$$2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$$

$$+ 1 = 136133552$$

Short method

000 000 111 110 000 011 111 110 001 010 101

1 00 11 11 10 00 01 11 10 01 00 00

= 760326125

111

$$0 \ 10000 \ 111100001110000111000011111100011$$

$$(1 \times 2^{39}) + (1 \times 2^{34}) + 2^{33} + 2^{32} + 2^{31} + 2^{30} + 2^6 + 2^{25} + 2^{21} + 2^{19} + 2^{14} +$$

$$2^{13} + 2^{11} + 2^{10} + 2^9 + 2^8 + 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 = 582206678003_{10}$$

582206678003_{10}

$\begin{array}{r} 3 \\ | \\ 36 \end{array}$

$387417375 \begin{array}{r} 16 \\ | \\ 15 \end{array}$

$2274244835 \begin{array}{r} 16 \\ | \\ 15 \end{array}$

$142140302 \begin{array}{r} 16 \\ | \\ 3 \end{array}$

$87693768 \begin{array}{r} 16 \\ | \\ 8 \end{array}$

$555235 \begin{array}{r} 16 \\ | \\ 3 \end{array}$

$347021 \begin{array}{r} 16 \\ | \\ 14 \end{array}$

$2168 \begin{array}{r} 16 \\ | \\ 8 \end{array}$

$133 \begin{array}{r} 16 \\ | \\ 7 \end{array}$

$8 \begin{array}{r} 16 \\ | \\ 7 \end{array}$

$8 \begin{array}{r} 16 \\ | \\ 8 \end{array}$

$-878 \begin{array}{r} 16 \\ | \\ -878 \end{array}$

$38 \begin{array}{r} 16 \\ | \\ -38 \end{array}$

$0 \begin{array}{r} 16 \\ | \\ 0 \end{array}$

Short method

$1000 \ 0111 \ 1000 \ 1110 \ 0011 \ 1000 \ 1110 \ 0011 \ 111 \ 0011$

8

7

8

C

3

B

C

3

F

3

$= 378E38E373_{16}$

$0 \ 101011010101110001100101010010101010$

10

16

5

16

$217770 \begin{array}{r} 16 \\ | \\ 17 \end{array}$

$17 \begin{array}{r} 16 \\ | \\ 10 \end{array}$

$08515610 \begin{array}{r} 16 \\ | \\ 10 \end{array}$

$181782100 \begin{array}{r} 16 \\ | \\ 10 \end{array}$

$11361381 \begin{array}{r} 16 \\ | \\ 4 \end{array}$

$710086 \begin{array}{r} 16 \\ | \\ 5 \end{array}$

$44380 \begin{array}{r} 16 \\ | \\ 6 \end{array}$

$4380 \begin{array}{r} 16 \\ | \\ 12 \end{array}$

$2773 \begin{array}{r} 16 \\ | \\ 5 \end{array}$

$173 \begin{array}{r} 16 \\ | \\ 13 \end{array}$

$10 \begin{array}{r} 16 \\ | \\ 10 \end{array}$

0

$= A05C654AAA$

Short method

$1010 \ 1101 \ 0101 \ 1100 \ 0110 \ 0101 \ 0100 \ 1010 \ 1010 \ 1010$

A

B

5

C

6

5

4

A

A

A

• 0101010101011111111100000000

$$2^{31} + 2^{29} + 2^{27} + 2^{21} + 2^0 + 2^{19} + 2^{18} + 2^{12} + 2^6 + 2^3 + 2^4 + 2^2 + 2^1 = 2864709564_{10}$$

2864709564₁₀

0 | 358088688 | 8

0 | 44761086 | 6

1365 | 8

5 | 170 | 8

2 | 2 | 8

5 | 2 | 8

2 | 0 | 8

= 28237777600

6 | 5595135 | 8

7 | 699391 | 8

7 | 87423 | 8

7 | 10923 | 8

7 | 1365

Short method

10 101 010 101 111 111 111 110 000 000

= 23237777600

• 11100011100000011111000000101010

110 001 110 000 001 111 111 101 000 101 010

61601774052

Long

$$2^{32} + 2^{31} + 2^{27} + 2^{26} + 2^5 + 2^{18} + 2^{12} + 2^6 + 2^{17} + 2^{14} + 2^{13} + 2^{11} + 2^0 \\ + 2^5 + 2^3 + 2^1 = 6677854250$$

6677854250₁₀

2 | 83473781 | 8

5 | 104341472 | 8

0 | 13042684 | 8

3184 | 8

1 | 398 | 8

0 | 44 | 8

1 | 6 | 8

6 | 0

= 61661774052₈

4 | 1630335 | 8

7 | 205791 | 8

2 | 20473 | 8

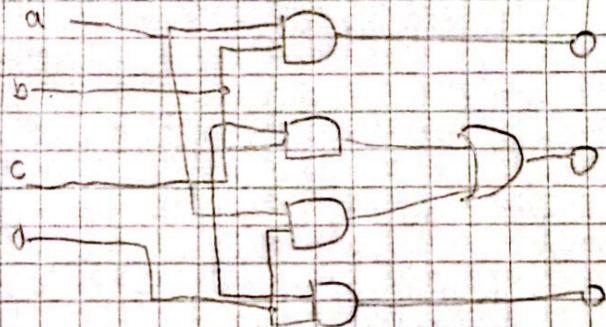
1 | 3184

Boolean Circuits

$$\begin{array}{r} 10 \\ \times 11 \\ \hline 11 \end{array}$$

$F =$

a	b	c	d	$AB \cdot CD$
1	1	1	1	1
1	0	1	0	0
1	1	0	0	0
0	0	0	0	0
0	0	0	0	0



3)

$$\circ -5 \times 8$$

$$\begin{array}{r} 5 \\ \times 8 \\ \hline 40 \\ +10 \\ \hline 100 \\ +10 \\ \hline 1010 \\ +10 \\ \hline 1011 \\ +101 \\ \hline 1011000 \end{array}$$

$$\begin{array}{r} 1011 \\ \times 1000 \\ \hline 0000 \\ 0000 \\ 0000 \\ 0000 \\ \hline 0000 \end{array}$$

$$-5 \times 8 = 1011000$$

$$\begin{array}{r} 8 \\ \times 12 \\ \hline 0 \\ 0 \\ 12 \\ +10 \\ \hline 0112 \end{array}$$

$$611 \times (-10)$$

$$\begin{array}{r} 11 \\ \times 10 \\ \hline 110 \end{array}$$

$$11 = 01011$$

$$\begin{array}{r} 10 \\ \times 10 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 01010 \\ \times 10101 \\ \hline 10110 \end{array}$$

$$\begin{array}{r} 01011 \\ \times 10110 \\ \hline 10110 \end{array}$$

$$\begin{array}{r} 10110 \\ +10110 \\ \hline 00000 \\ +10110 \\ \hline 11010010 \end{array}$$

$$11 \times (-10) = 11010010$$

$$2 \times 3$$

$$\begin{array}{r} 2 \\ \times 3 \\ \hline 0 \\ 1 \end{array}$$

$$\begin{array}{r} 3 \\ \times 1 \\ \hline 1 \\ 1 \end{array}$$

$$\begin{array}{r} 10 \\ \times 11 \\ \hline 10 \\ 10 \\ \hline 110 \end{array}$$

$$2 \times 3 = 110_{(2)}$$

$$(-4) \times (-8)$$

$$\begin{array}{r} 4 \\ \times 8 \\ \hline 0 \\ 1 \\ 2 \\ +1 \\ \hline 1100 \end{array}$$

$$\begin{array}{r} 8 \\ \times 04 \\ \hline 0 \\ 1 \\ 2 \\ +1 \\ \hline 1100 \end{array}$$

$$\begin{array}{r} 1 \\ \times 11000 \\ \hline 11000 \end{array}$$

$$\begin{array}{r} 11000 \\ \times 1100 \\ \hline 00000 \\ 00000 \\ \hline 11000 \end{array}$$

$$(-4) \times (-8) = 100100000_{(2)}$$

$$\begin{array}{r} 0100 \\ +101 \\ \hline 1100 \end{array}$$

$$\begin{array}{r} 01000 \\ +0111 \\ \hline 11000 \end{array}$$

$$\begin{array}{r} 11000 \\ +1100 \\ \hline 00000 \\ +1100 \\ \hline 11000 \end{array}$$