Lista de exercícios - Circuitos Lógicos e Digitais

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① Converta para o sistema Decimal

a)

100110

32	16	8	4	2	1
1	0	0	1	1	0

$= 38_{10}$

b)

011110

32	16	8	4	2	1
0	1	1	1	1	0

$= 30_{10}$

c)

111011

32	16	8	4	2	1
1	1	1	0	1	1

$= 59_{10}$

D)

1010000

64	32	16	8	4	2	1
1	0	1	0	0	0	0

$= 80_{10}$

e)

11000101

128	64	32	16	8	4	2	1
1	1	0	0	0	1	0	1

$= 197_{10}$

f)

11010110

128	64	32	16	8	4	2	1
1	1	0	1	0	1	1	0

$= 214_{10}$

G)

011001100110101

16.384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1
0	1	1	0	0	1	1	0	0	1	1	0	1	0	1

$= 13.109_{10}$

Somando, temos

② Converta para o sistema Binário:

a) $78 =$

64	32	16	8	4	2	1
1	0	0	1	1	1	0

$_2$

b) $102 =$

64	32	16	8	4	2	1
1	1	0	0	1	1	0

$_2$

c) $215 =$

128	64	32	16	8	4	2	1
1	1	0	1	0	1	1	1

$_2$

D) $404 =$

256	128	64	32	16	8	4	2	1
1	1	0	0	1	0	1	0	0

$_2$

e) $808 =$

512	256	128	64	32	16	8	4	2	1
1	1	0	0	1	0	1	0	0	0

$_2$

f) $5429 =$

4096	2048	1024	512	256	128	64	32	16	8	4	2	1
1	0	1	0	1	0	0	1	1	0	1	0	1

$_2$

8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1
1	1	1	1	1	0	1	1	1	0	0	1	1	1

$_2$

16.383

(3)

A) $512 \rightarrow \log_2 (512) = 9$

número de Bits necessários = (9)

B) $12 \rightarrow \log_2 (12) \approx 3,6$

número de bits necessários = (4)

C) $2 \rightarrow \log_2 (2) = 1$

número de bits necessários = (1)

D) $17 \rightarrow \log_2 (17) \approx 4,08$

número de bits necessários = (5)

e) $33 \rightarrow \log_2 (33) \approx 5,04$

número de Bits necessários = (6)

f) $43 \rightarrow \log_2 (43) \approx = 5,42$

número de BITS necessários = (6)

G) $7 \rightarrow \log_2 (7) \approx 2,8$

número de Bits necessários = 3

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(4) (A) $479_{16} = (4 \times 16^2) + (7 \times 16^1) + (9 \times 16^0)$

$= (4 \times 256) + (7 \times 16) + (9 \times 1)$

$= \boxed{1145_{10}}$

B) $4AB_{16} = (4 \times 16^2) + (10 \times 16^1) + (11 \times 16^0)$

$= (4 \times 256) + (10 \times 16) + (11 \times 1)$

$= \boxed{1195_{10}}$

c) $BDE_{16} = (11 \times 16^2) + (13 \times 16^1) + (14 \times 16^0)$

$= (11 \times 256) + (13 \times 16) + (14 \times 1)$

$= \boxed{3038_{10}}$

D) $FOCA_{16} = (15 \times 16^3) + (0 \times 16^2) + (12 \times 16^1) + (10 \times 16^0)$

$= (15 \times 4096) + (0) + (12 \times 16) + (10)$

$= \boxed{61642_{10}}$

E) $2D3F_{16} = (2 \times 16^3) + (13 \times 16^2) + (3 \times 16^1) + (15 \times 16^0)$

$= (2 \times 4096) + (13 \times 256) + (3 \times 16) + (15 \times 1)$

$= \boxed{11583_{10}}$

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⑤

Ⓐ $486_{10} =$ 486 | 16
480   30 | 16
Ⓞ   16   ① | 16
(14)   0

$486_{10} = 1E6_{16}$

Ⓑ $2000_{10} =$ 2000 | 16
2000   125 | 16
Ⓞ   112   7 | 16
0(13)   0   0
⑦

$2000_{10} = 7D0_{16}$

Ⓒ $4096_{10} =$ 4096 | 16
4096   256 | 16
Ⓞ   256   16 | 16
Ⓞ   16   1 | 16
Ⓞ   0   0
①

$4096_{10} = 1000_{16}$

Ⓓ $5555_{10} =$ 5555 | 16
5552   347 | 16
③   336   21 | 16
0(11)   16   1 | 16
05   0   0
①

$5555_{10} = 15B3_{16}$

ⓔ $35479_{10} =$ 35479 | 16
35472   2217 | 16
⑦   2208   138 | 16
⑨   128   8 | 16
⑩   0   0
⑧

$35479_{10} = 8A97_{16}$

⑥

Ⓐ $84_{16} \rightarrow$ 8 = 1000
4 = 0100

$84_{16} = 10000100_2$

Ⓑ $7F_{16}$ 7 = 0111
F = 1111

$7F_{16} = 01111111_2$

Ⓒ $3B8C_{16}$ 3 = 0011   C = 1100
B = 1011
8 = 1000

$3B8C_{16} = 0011101110001100_2$

Ⓓ $47FD_{16}$ 4 = 0100   F = 1111
7 = 0111   D = 1101

$47FD_{16} = 0100011111111101_2$

ⓔ $F1CD_{16}$ F = 1111   C = 1100
1 = 0001   D = 1101

$F1CD_{16} = 1111000111001101_2$

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7) a) $10011_2 =$ ␣ $\underbrace{0001}_{1}$ ␣ $\underbrace{0011}_{3}$

$\boxed{10011_2 = 13_{16}}$

b) $11100\,11100_2 =$ $\underbrace{0011}_{3}$ $\underbrace{1001}_{9}$ $\underbrace{1100}_{C}$

$\boxed{11100\,11100_2 = 39C_{16}}$

c) $1001\,1001\,10011_2 =$ $\underbrace{1001}_{9}$ $\underbrace{1001}_{9}$ $\underbrace{0011}_{3}$

$\boxed{1001\,1001\,10011_2 = 993_{16}}$

D) $11110\,1111\,00010_2 = \boxed{3EF2_{16}}$

$\underbrace{0011}_{3}$ $\underbrace{1110}_{E}$ $\underbrace{1111}_{F}$ $\underbrace{0010}_{2}$

E) $1000000000\,100010_2 = \boxed{40110_{16}}$

$\underbrace{0100}_{4}$ $\underbrace{0000}_{0}$ $\underbrace{0001}_{1}$ $\underbrace{0001}_{1}$ $\underbrace{0000}_{0}$

8) a) $1000_2 + 1001 =$
$\begin{array}{r} 1000 \\ + 1001 \\ \hline \boxed{10001} \end{array}$

B) $10001_2 + 11110_2 =$
$\begin{array}{r} 10001 \\ + 11110 \\ \hline \boxed{101111} \end{array}$

C) $101_2 + 100101_2 =$
$\begin{array}{r} 000101 \\ + 100101 \\ \hline \boxed{101010} \end{array}$

D) $1110_2 + 1001011_2 + 1110_2 =$

$\begin{array}{r} 111 \\ 000\,1110 \\ + 100\,1011 \\ \hline 101\,1001 \end{array}$

$\begin{array}{r} 11 \\ 101\,1001 \\ + 001\,1101 \\ \hline \boxed{1110110}_2 \end{array}$

E) $110101_2 + 1011001 + 1111110_2$

$\begin{array}{r} 11\,1 \\ 0110101 \\ 1011001 \\ \hline 10001110 \end{array}_2$

$\begin{array}{r} 111111 \\ 1000\,1110 \\ + 011\,11110 \\ \hline \boxed{100001100}_2 \end{array}$

(9) (a) $01110100_2 \xrightarrow{\text{INVERTIDO}} \boxed{10001011_2}$

(B) $11000010_2 \xrightarrow{\text{INVERTIDO}} \boxed{00111101_2}$

(10) (a) $-1011_2 \xrightarrow{\oplus} 01011_2 \xrightarrow{\text{INVERTIDO}} 10100_2 +1 = \boxed{10101_2}$

(B) $-100001 \xrightarrow{\oplus} 0100001_2 \xrightarrow{\text{INVERTIDO}} 1011110_2 +1 = \boxed{1011111_2}$

(C) $-10111101_2 \xrightarrow{\text{INVERTIDO}} 01000010_2 +1 = \boxed{01000011_2}$

(D) $-11010100_2 \xrightarrow{\text{INVERTIDO}} 00101011_2 +1 = \boxed{00101100_2}$

(E) $-01010011_2 \xrightarrow{\text{INVERTIDO}} 10101100_2 +1 = \boxed{10101101_2}$

(11) $\boxed{10110111_2} \longrightarrow$ INVERTENDO OS BITS

$\downarrow$ negativo

$10110111_2 \rightarrow 01001000_2 +1 = 01001001_2$

CONVERTENDO p/ DECIMAL

128	64	32	16	8	4	2	1
0	1	0	0	1	0	0	1

$= 73_{10}$ ↳ O número original é negativo,

logo $\rightarrow \boxed{-73_{10}}$

(12) (A) $101101_2 - 10011_2$

8 Bit ↓ 00101101   8 Bit ↓ 00010011

```
  00101101
+ 11101101
──────────
 100011010
```

DESCARTANDO o BIT à esquerda temos:

$00011010_2 = 26_{10}$

(B) $10000110_2 - 11011_2$

JÁ TEM 8 bit   00011011 → INVERTENDO → 11001100 + 1 = 11001101

```
  10000110
+ 11001101
──────────
101010011_2
```

↑ DESCARTANDO, temos

$01010011 = 83_{10}$

(C) $111100_2 - 1101011_2$

8 bit ↓ 00111100   → INVERTENDO → 00010100 + 1 = 00010101

```
  00111100
+ 00010101
──────────
 01010001_2 =
```

81_{10}

(D) $-1001011 + 1101010_2$

→ INVERTENDO → 01101100 + 1 = 01101101

```
  01101101
+ 11011010
──────────
①01000111_2
```

DESCARTANDO o BIT à esquerda ✗

$= 71_{10}$

(E) $-10011101_2 - 1000101_2$

8 bit ↓

INVERTENDO   01000101 → INVERTENDO → 10111010 + 1 = 10111011_2

INVERTENDO   01100010 + 1 = 01100011_2

```
  10111011
+ 01100011
──────────
①00011110
```

DESCARTANDO

$00011110_2 = 30_{10}$

13 (A) $44_{16} - 3E_{16}$

$44_{16} = 01000100_2$

$3E_{16} = 00111110_2 \xrightarrow{\text{INVERTENDO}} 11000001 (+1) = 11000010_2$

$\begin{array}{r} 01000100 \\ + \ 11000010 \\ \hline (1)00000110 \end{array}$

DESCARTANDO, TEMOS $00000110_2 = (6_{10})$

(B) $A9_{16} - E0_{16}$

$A9 = 10101001_2$

$E0 = 11100000_2$

$\xrightarrow{\text{INVERTENDO}} 00011111 + (1) = 00100000_2$

$\begin{array}{r} 10101001 \\ + \ 00100000 \\ \hline (1)1001001_2 \end{array}$

negativo

$\xrightarrow{\text{INVERTENDO}} 00110110 (+) 1 = 00110111_2$

(-55_{10}) 55_{10}, como o número é negativo,

(C) $-BC_{16} + FC_{16}$

$BC = 10111100$ $\xrightarrow{\text{INVERTENDO}} 01000011 (+1) = 01000100_2$

$-BC = 01000100$

$FC = 11111100_2$

$\begin{array}{r} 01000100 \\ + \ 11111100 \\ \hline (1)01000000_2 \end{array}$

DESCARTANDO TEMOS, $01000000_2 = (64_{10})$

(D) $-22_{16} - 1D_{16}$

$\text{complemento de 2} \rightarrow 22 = 00100010 \rightarrow \text{INVERTENDO} \rightarrow 11011101_2 +1$

11011110_2

$-22 = 11011110_2$

$1D = 00011101_2 \rightarrow \text{complemento de 2} \rightarrow 11100010 +1 = 11100011_2$

$\begin{array}{r} 11011110 \\ + \ 11100011 \\ \hline (1)11000001 \end{array}$

DESCARTANDO TEMOS,

$\text{complemento de 2} = 00111110_2 +1 =$

00111111

11000001_2 negativo

(-63_{10})