

# SISTEMAS DIGITAIS - FOLHA 1

## SISTEMAS DE NUMERAÇÃO E CÓDIGOS

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1. Converter os seguintes números binários para decimal  
(a) 1010111 (b) 0.00101 (c) 1011010.1010
2. Converter os seguintes números de base 8 para base 10  
(a) 273 (b) 1021 (c) 16.432
3. Converter os seguintes números hexadecimais (base 16) para decimais (base 10)  
(a) 145 (b) A2C1 (c) 1A.B2
4. Converter de base 2 para base 16  
(a) 1010.111010110111.1011  
(b) 011011110011110000000001
5. Converter de base 16 para base 2  
(a) 1A.B2 (b) A2C1 (c) F0AC29E
6. Converter de decimal para binário  
(a) 122 (b) 98 (c) 48.45 (d) 195.98
7. Faça as adições e subtrações seguintes  
(a) 101011 + 10111  
(b) 1101 + 1110 + 1001  
(c) 11101 - 10110  
(d) 1100.010 - 1000.111

SISTEMAS DIGITAIS - FOLHA 1 SOLUÇÃO  
SISTEMAS DE NUMERAÇÃO E CÓDIGOS

Base 10 (decimal)

$$(N)_{10} = d_{n-1} 10^{n-1} + \dots + d_2 10^2 + d_1 10^1 + d_0 10^0 + d_{-1} 10^{-1} + d_{-2} 10^{-2} + \dots + d_{-m} 10^{-m}$$

Exemplo

$$(473.85)_{10} = 4 \times 10^2 + 7 \times 10^1 + 3 \times 10^0 + 8 \times 10^{-1} + 5 \times 10^{-2}$$

Base 2 (binário)

$$(N)_2 = b_{n-1} 2^{n-1} + \dots + b_2 2^2 + b_1 2^1 + b_0 2^0 + b_{-1} 2^{-1} + b_{-2} 2^{-2} + \dots + b_{-m} 2^{-m}$$

1(a)

$$(1010111)_2 = 1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$= 64 + 0 + 16 + 0 + 4 + 2 + 1 = (87)_{10}$$

1(b)

$$(0.00101)_2 = 0 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3} + 0 \times 2^{-4} + 1 \times 2^{-5}$$

$$= \frac{1}{2^3} + \frac{1}{2^5} = 0.125 + 0.03125 = (0.15625)_{10}$$

1(c)

$$(1011010.1010)_2 = 1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$$

$$+ 1 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3} + 0 \times 2^{-4}$$

$$= 64 + 16 + 8 + 2 + 0.5 + 0.125$$

$$= (90.625)_{10}$$

2(a)

$$(273)_8 = 2 \times 8^2 + 7 \times 8^1 + 3 \times 8^0 = 2 \times 64 + 7 \times 8 + 3 = (187)_{10}$$

2(b)

$$(1021)_8 = 1 \times 8^3 + 0 \times 8^2 + 2 \times 8^1 + 1 \times 8^0 = 512 + 2 \times 8 + 1 = (527)_{10}$$

2(c)

$$(16.432)_8 = 1 \times 8^1 + 6 \times 8^0 + 4 \times 8^{-1} + 3 \times 8^{-2} + 2 \times 8^{-3}$$

$$= 8 + 6 + 4 \times 0.125 + 3 \times 0.015625 + 2 \times 0.0019531$$

$$= (14.5507813)_{10}$$

3(c)

$$(145)_{16} = 1 \times 16^2 + 4 \times 16^1 + 5 \times 16^0 = (325)_{10}$$

$$(A2C1)_{16} = 10 \times 16^3 + 2 \times 16^2 + 12 \times 16^1 + 1 \times 16^0 = (41665)_{10}$$

$$(1A.B2)_{16} = 1 \times 16^1 + 10 \times 16^0 + 11 \times 16^{-1} + 2 \times 16^{-2} = 16 + 10 + \frac{11}{16} + \frac{2}{16^2} = 26.6953125$$

4(a)

$$\underbrace{1010}_A \underbrace{1110}_E \underbrace{1011}_B \underbrace{0111}_7 \underbrace{1011}_B = (AEB7B)_{16}$$

4(b)

$$\underbrace{0110}_6 \underbrace{1111}_F \underbrace{0011}_3 \underbrace{1100}_C \underbrace{0000}_\phi \underbrace{0001}_1 = (6F3C\phi 1)_{16}$$

5(a)

$$(1A.B2)_{16} = \underbrace{0001}_1 \underbrace{1010}_A \cdot \underbrace{1011}_B \underbrace{0010}_2$$

5(b)

$$(A2C1)_{16} = \underbrace{1010}_A \underbrace{0010}_2 \underbrace{1100}_C \underbrace{0001}_1$$

5(c)

$$(F\phi AC27E)_{16} = 1111 0000 1010 1100 0010 1001 1110$$

$$4(a) \quad N_2 = b_{n-1} 2^{n-1} + \dots + b_2 2^2 + b_1 2^1 + b_0 2^0$$

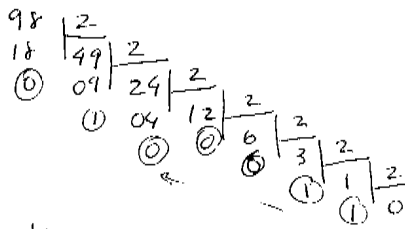
$$\frac{N_2}{2} = b_{n-1} 2^{n-2} + \dots + b_2 2^1 + b_1 2^0 + \left\lfloor \frac{b_0}{2} \right\rfloor$$

resto da divisão  
de  $b_0$

$$\begin{array}{r} 122 \quad | \quad 2 \\ 02 \quad | \quad 61 \quad | \quad 2 \\ \textcircled{0} \quad | \quad 01 \quad | \quad 30 \quad | \quad 2 \\ \quad \quad | \quad \quad | \quad 10 \quad | \quad 15 \quad | \quad 2 \\ \quad \quad | \quad \quad | \quad \quad | \quad 07 \quad | \quad 2 \\ \quad \quad | \quad \quad | \quad \quad | \quad \quad | \quad 03 \quad | \quad 2 \\ \quad \quad | \quad \quad | \quad \quad | \quad \quad | \quad \quad | \quad 01 \quad | \quad 2 \\ \quad \quad | \quad \quad | \quad \quad | \quad \quad | \quad \quad | \quad \quad | \quad 00 \end{array}$$

Resultado  $(122)_{10} = (1111010)_2$

6(b)



Resultado

$$(98)_{10} = (1100010)_2$$

6(c)

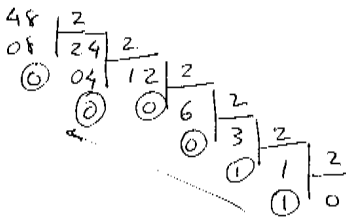
$$N_2 = b_{-1} 2^{-1} + b_{-2} 2^{-2} + \dots + b_{-m} 2^{-m}$$

$$2 \times N_2 = \boxed{b_{-1}} + b_{-2} 2^{-1} + \dots + b_{-m} 2^{-m+1}$$

parte inteira é  $b_{-1}$

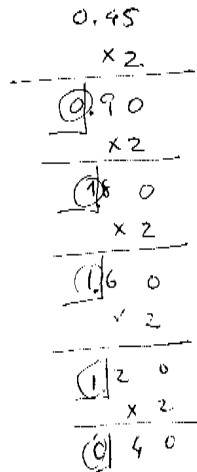
PARTE FRACIONÁRIA

PARTE INTEIRA



$$(48)_{10} = (110000)_2$$

$$(0.45)_{10} = (0.01110)_2$$

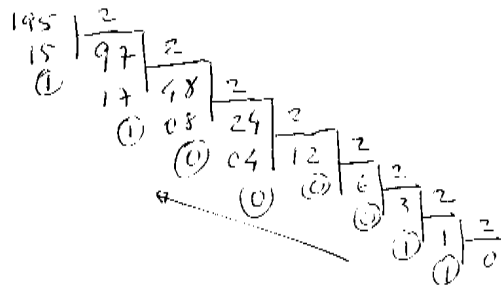


Resultado

$$(48.45)_{10} = (110000.01110)_2$$

6(d)

PARTE INTEIRA



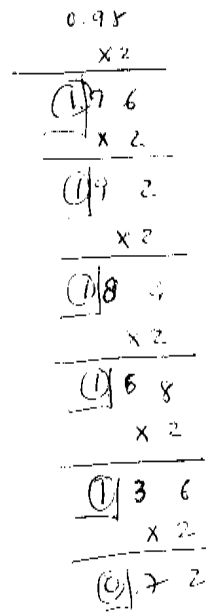
$$(195)_{10} = (11000011)_2$$

$$(0.98)_{10} = (0.111110)_2$$

Resultado

$$(195.98)_{10} = (11000011.111110)_2$$

PARTE FRACIONARIA



7(a)

$$\begin{array}{r} 11111 \leftarrow \text{TRANSPORTE (CARRY)} \\ 101011 \\ + 10111 \\ \hline 1000010 \end{array}$$

7(b)

$$\begin{array}{r} 1101 \\ + 1110 \\ \hline 11011 \end{array}$$

$$\begin{array}{r} 11011 \\ + 1001 \\ \hline 100100 \end{array}$$

7(c)

$$\begin{array}{r} 11101 \\ - 10110 \\ \hline 11 \\ \hline 00111 \end{array}$$

← EMPRÉSTIMO (BORROW) →

7(d)

$$\begin{array}{r} 1100.010 \\ - 1000.111 \\ \hline 111.11 \\ \hline 0011.011 \end{array}$$

Exemplo em decimal

$$\begin{array}{r} 39456 \\ - 29537 \\ \hline 9919 \end{array}$$

$$\begin{array}{r} 111 \\ \hline 09919 \end{array}$$