

IMMC - AULA 9 – RESOLUÇÃO DOS EXERCÍCIOS

Exercícios:

1- Converter os seguintes números nas bases estipuladas:

a) $134 \rightarrow (10000110)_2$

$$\begin{array}{rcl}
 134 & / & 2 \\
 0 & 67 & / 2 \\
 & 1 & 33 / 2 \\
 & & 1 \quad 16 / 2 \\
 & & & 0 \quad 8 / 2 \\
 & & & & 0 \quad 4 / 2 \\
 & & & & & 0 \quad 2 / 2 \\
 & & & & & & 0 \quad 1 / 2 \\
 & & & & & & & 1 \quad 0
 \end{array}$$

b) $(10000110)_2 \rightarrow (134)_{10}$

$$\begin{aligned}
 (10000110)_2 &= 1 \cdot 2^7 + 0 \cdot 2^6 + 0 \cdot 2^5 + 0 \cdot 2^4 + 0 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0 \\
 &= 1 \cdot 128 + 0 \cdot 64 + 0 \cdot 32 + 0 \cdot 16 + 0 \cdot 8 + 1 \cdot 4 + 1 \cdot 2 + 0 \cdot 1 \\
 &= 128 + 0 + 0 + 0 + 0 + 4 + 2 + 0 \\
 &= 134
 \end{aligned}$$

c) $1000 \rightarrow (3E8)_{16}$

$$\begin{array}{rcl}
 1000 & / & 16 \\
 8 & 62 & / 16 \\
 (E)_{16} & \leftarrow & 14 \quad 3 / 16 \\
 & & 3 \quad 0
 \end{array}$$

d) $(3E8)_{16} \rightarrow (1000)_{10}$

$$\begin{aligned}
 (3E8)_{16} &= 3 \cdot 16^2 + E \cdot 16^1 + 8 \cdot 16^0 \\
 &= 3 \cdot 256 + 14 \cdot 16 + 8 \cdot 1 \\
 &= 768 + 224 + 8 \\
 &= 1000
 \end{aligned}$$

e) $1104 \rightarrow (2120)_8$

$$\begin{array}{r} 1104 / 8 \\ \hline 0 \quad 138 / 8 \\ \swarrow \quad \downarrow \\ 2 \quad 17 / 8 \\ \quad \downarrow \\ 1 \quad 2 / 8 \\ \quad \downarrow \\ 2 \quad 0 \end{array}$$

f) $(2120)_8 \rightarrow (1104)_{10}$

$$\begin{aligned} (2120)_8 &= 2 \cdot 8^3 + 1 \cdot 8^2 + 2 \cdot 8^1 + 0 \cdot 8^0 \\ &= 2 \cdot 512 + 1 \cdot 64 + 2 \cdot 8 + 0 \cdot 1 \\ &= 1024 + 64 + 16 + 0 \\ &= 1104 \end{aligned}$$

g) $(100110)_2 \rightarrow (26)_{16}$

$$\begin{array}{ccc} (10)_2 & & (0110)_2 \\ \downarrow & & \downarrow \\ (2)_{16} & \Leftrightarrow & (6)_{16} \\ \downarrow & & \\ (26)_{16} & & \end{array}$$

h) $(26)_{16} \rightarrow (100110)_2$

$$\begin{array}{ccc} (2)_{16} & & (6)_{16} \\ \downarrow & & \downarrow \\ (0010)_2 & \Leftrightarrow & (0110)_2 \\ \downarrow & & \\ (00100110)_2 & & \end{array}$$

i) $(100110)_2 \rightarrow (46)_8$

$$\begin{array}{ccc} (100)_2 & & (110)_2 \\ \downarrow & & \downarrow \\ (4)_8 & \Leftrightarrow & (6)_8 \\ \downarrow & & \\ (46)_8 & & \end{array}$$

$$\begin{aligned}
 \text{j) } (1000111111)_8 &\rightarrow (1000000000001001001001001001)_2 \\
 (1)_8 &\Leftrightarrow (0)_8 \Leftrightarrow (0)_8 \Leftrightarrow (0)_8 \Leftrightarrow (1)_8 \Leftrightarrow (1)_8 \Leftrightarrow (1)_8 \Leftrightarrow (1)_8 \Leftrightarrow (1)_8 \Leftrightarrow (1)_8 \\
 \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\
 (001)_2 (000)_2 (000)_2 (000)_2 (001)_2 (001)_2 (001)_2 (001)_2 (001)_2 (001)_2 \\
 \downarrow \\
 (1000000000001001001001001001)_2
 \end{aligned}$$

2- Fazer as seguintes operações aritméticas entre as bases:

$$\begin{aligned}
 \text{a) } (10AC26)_{16} + (107135)_{16} &= (211D5B)_{16} \\
 &\quad \quad \quad 1 \\
 &\quad \quad \quad (1 \ 0 \ A \ C \ 2 \ 6)_{16} \\
 &\quad \quad \quad (1 \ 0 \ 7 \ 1 \ 3 \ 5)_{16} \quad + \\
 &\quad \quad \quad \hline
 &\quad \quad \quad (2 \ 1 \ 1 \ D \ 5 \ B)_{16}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } (211D5B)_{16} - (10AC26)_{16} &= (107135)_{16} \\
 &\quad \quad \quad (2 \ 1 \ 1^1 \ D \ 5 \ B)_{16} \\
 &\quad \quad \quad (1 \ 0^1 \ A \ C \ 2 \ 6)_{16} \quad - \\
 &\quad \quad \quad \hline
 &\quad \quad \quad (1 \ 0 \ 7 \ 1 \ 3 \ 5)_{16}
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } (77642)_8 + (210)_8 &= (100052)_8 \\
 &\quad \quad \quad 1 \ 1 \\
 &\quad \quad \quad (7 \ 7 \ 6 \ 4 \ 2)_8 \\
 &\quad \quad \quad (\ 2 \ 1 \ 0)_8 \quad + \\
 &\quad \quad \quad \hline
 &\quad \quad \quad (1 \ 0 \ 0 \ 0 \ 5 \ 2)_8
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } (100052)_8 - (210)_8 &= (77642)_8 \\
 &\quad \quad \quad (1 \ 1^0 \ 1^0 \ 1^0 \ 5 \ 2)_8 \\
 &\quad \quad \quad (\ 1 \ 1 \ 1 \ 2 \ 1 \ 0)_8 \quad - \\
 &\quad \quad \quad \hline
 &\quad \quad \quad (\ 7 \ 7 \ 6 \ 4 \ 2)_8
 \end{aligned}$$

e) $(11110101)_2 + (101010)_2 = (100011111)_2$

$$\begin{array}{r} 1 1 \\ (1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 0 \ 1)_2 \\ (1 \ 0 \ 1 \ 0 \ 1 \ 0)_2 \quad + \\ \hline (1 \ 0 \ 0 \ 0 \ 1 \ 1 \ 1 \ 1 \ 1)_2 \end{array}$$

f) $(100011111)_2 - (11110101)_2 = (101010)_2$

$$\begin{array}{r} (1 \ 1 \ 0 \ 1 \ 0 \ 1 \ 1 \ 1 \ 1 \ 1)_2 \\ (\ 1 \ 1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 0 \ 1)_2 \quad - \\ \hline (0 \ 0 \ 0 \ 1 \ 0 \ 1 \ 0 \ 1 \ 0)_2 \end{array}$$

g) $(10101)_2 + (10100)_{16} + (10000)_8 = (69909)_{10}$

$$\begin{array}{rcl} (10101)_2 & = & 21 \\ (10100)_{16} & = & 65792 \\ (10000)_8 & = & 4096 \\ & & \hline & & 69909 \end{array} \quad +$$

3- Dada a base fictícia, realizar a operação aritmética:

Base: # Λ Ψ θ

Operação: (**Y L Y # q**)_x + (**L # Y q Y**)_x = (**θ Ψ Λ # Λ**)_x

Solução:

- Desenvolver a seqüência na base fictícia:

#	L	Y	q	
L#	LL	LY	Lq	
Y#	YL	YY	Yq	
q#	qL	qY	qq	
L##	L#L	L#Y	L#q	
LL#	LLL	LLY	LLq	
LY#	LYL	LYY	LYq	
Lq#	LqL	LqY	Lqq	... ∞

- Executar a operação matemática na base fictícia, caminhando sobre a seqüência desenvolvida no sentido correto (soma: do nulo ao infinito; e subtração: do infinito ao nulo):

$$\begin{array}{r}
 \begin{array}{cccccc}
 & \Lambda & \Lambda & \Lambda & & \\
 (& \mathbf{Y} & \mathbf{L} & \mathbf{Y} & \mathbf{\#} & \mathbf{q})_x \\
 (& \mathbf{L} & \mathbf{\#} & \mathbf{Y} & \mathbf{q} & \mathbf{Y})_x + \\
 \hline
 (& \theta & \Psi & \Lambda & \mathbf{\#} & \Lambda)_x
 \end{array}
 \end{array}$$