Sistemi di numerazione

5 Δ V

$5 \qquad A_b$ A: numerale / cifra
b: Base.

Base 10: 0 1 2 3 4 5 6 7 8 9

Base b: cifre 0 ---> b-1 $[0, b-1]$

Sistema posizionale 123
213

$$N = \sum_{n=0}^{c-1} a_n b^n$$

c: # cifre a_n: nesima cifra

$123 = 3 \times 10^0 + 2 \times 10^1 + 1 \times 10^2$

3 cifre: c = 3

$213 = 3 \times 10^0 + 1 \times 10^1 + 2 \times 10^2$

$100_2 = 0 \times 2^0 + 0 \times 2^1 + 1 \times 2^2 = 4_{10}$

$100_2 \neq 100_{10}$

- Conversione di base

7_{10}

1) a tentativi:

$8 = 2^3 > 7 \longrightarrow 4 = 2^2$

$7 = 4 + 3 = 4 + 2 + 1 = 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

111_2

$123756_{10} \longrightarrow$

2) Metodo algoritmico. $10 \rightarrow 2$

$N = 73_{10}$

$73/2 = 36$	resto	1
$36/2 = 18$	resto	0
$18/2 = 9$		0
$9/2 = 4$		1
$4/2 = 2$		0
$2/2 = 1$		0
$1/2 = 0$		1

		r
$7/2 = 3$		1
$3/2 = 1$		1
$1/2 = 0$		1

6_{10}:

		r
$6/2$	3	0
$3/2$	1	1
$1/2$	0	1

$6_{10} \rightarrow 110_2 = 0 \times 2^0 + 1 \times 2^1 + 1 \times 2^2$

$7_{10} \rightarrow 111_2 = 1 \times 2^0 + 1 \times 2^1 + 1 \times 2^2$

$73_{10} \rightarrow 1001001_2$

10	11	12	13	14	15

Base 16: 0 1 2 3 4 5 6 7 8 9 A B C D E F

$16_{10} = 10_{16}$

$1F_{16} = 15 \times 16^0 + 1 \times 16 = 15 + 16 = 17_{10}$

$17_{10} = 11_{16}$

$1F_{16} = F_{16} \times 16_{10}^0 + 1 \times 16_{10}^1 =$

$= 15_{10} \times 16_{10}^0 + 1_{10} \times 16_{10}^1$

$= 15 \times 1 + 1 \times 16 = 15 + 16 = 31_{10}$

$13_{10} \rightarrow ?_{16}$

$\frac{13}{16} = 0$ resto $13_{10} = D$

Base 2: □ □ □ □ 0 ... 15 10.

Base 16: □

4 cifre in base 2 corrispondono a 1 cifra in base 16

Base 2: 0, 1, 10, 11, 100, 101, 110, 111

4 cifre $1111_2 = 15_{10} = F_{16}$ ← 1 cifra

Convertire 1010110011110001_2 in base 16

$|1010|0110|0111|0001| = 5671_{16}$

5 6 7 1

$1011_2 = 1\times2^0 + 1\times2^1 + 0\times2^2 + 1\times2^3 = 11_{10} = B_{16}$

Conversione da base 2 a base 8:

Base 8: 0 ... 7

$8_{10} = 2^3$ □ □ □

con 3 cifre in base 2

$2^3 = 8$

3 cifre in base 2 → 1 cifra in base 8

Convertire 1010110011110001_2 in base 8

$|101|011|001|110|001_2 = 53161_8$

5 3 1 6 1

$1010110011110001_2 = 53161_8 = 5671_{16} =$? $_{10}$

Calcolare