

M02A14 – Revisão Binários Negativos

Revisão números positivos e negativos na base 2

Números positivos

$$(+24)_{10} \quad \begin{array}{cccc|cccc} 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 128 & 64 & 32 & 16 & 8 & 4 & 2 & 1 \\ & & & \cdot & \cdot & & & \end{array}$$

Números Negativos – Decimal para binário

$$(-18)_{10} \xrightarrow{-1} \begin{array}{cccc|cccc} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 128 & 64 & 32 & 16 & 8 & 4 & 2 & 1 \\ & & & \cdot & \cdot & & & \end{array}$$

$\boxed{1110 \quad 1110} = (-18)_2$

Binário para decimal negativo:

$$\begin{array}{cccc|cccc} & & & & 16 & 8 & 4 & 2 & 1 \\ & & & & \cdot & & & \cdot & \\ \boxed{111} & 0 & 1 & 1 & 0 & 1 & & & \\ \hline & & & & & & & & \end{array}$$

-19
 $+1$
 $-$

Exercícios

• Represente :

a) $(+35)_{10} \rightarrow (?)_2$

b) $(-27)_{10} \rightarrow (?)_2$

• Qual é o número em decimal ?

a) $(00011011)_2 \rightarrow (?)_{10}$

b) $(11110111)_2 \rightarrow (?)_{10}$

M02A15 – Operadores Bitwise (parte 1)

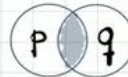
Representação com TRUE e FALSE

Operadores bitwise

• Conjunção \wedge

E

p	q	p E q
true	true	true
true	false	false
false	true	false
false	false	false



• Disjunção \vee

ou

p	q	p ou q
true	true	true
true	false	true
false	true	true
false	false	false



• Disjunção Exclusiva \veebar

xou

p	q	p xou q
true	true	false
true	false	true
false	true	true
false	false	false



$\odot \rightarrow \text{true} \rightarrow$

$\odot \rightarrow \text{false} \rightarrow$

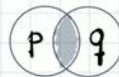
Representação BINÁRIA

Operadores bitwise

• Conjunção \wedge

E

p	q	p & q
1	1	1
1	0	0
0	1	0
0	0	0



• Disjunção \vee

ou

p	q	p q
1	1	1
1	0	1
0	1	1
0	0	0



• Disjunção Exclusiva \veebar

xou

p	q	p ^ q
1	1	0
1	0	1
0	1	1
0	0	0



$\odot \rightarrow \text{true} \rightarrow 1$

$\odot \rightarrow \text{false} \rightarrow 0$

Exercícios

Exercícios bitwise

26 & 12 →

$$\begin{array}{r}
 11010 \\
 \& 01100 \\
 \hline
 01000 \\
 \text{16 8 4 2 1}
 \end{array}
 \rightarrow 8$$

26 | 12

$$\begin{array}{r}
 11010 \\
 | 01100 \\
 \hline
 11110 \\
 \text{16 8 4 2 1}
 \end{array}
 \rightarrow 30$$

26 ^ 12

$$\begin{array}{r}
 11010 \\
 ^ 01100 \\
 \hline
 10110 \\
 \text{16 8 4 2 1}
 \end{array}
 \rightarrow 22$$

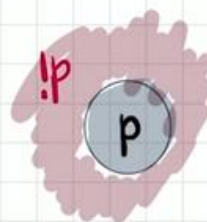
$$\begin{array}{c|c}
 \text{(26)} & \text{(12)} \\
 \hline
 \begin{array}{ccccc}
 16 & 8 & 4 & 2 & 1 \\
 1 & 1 & 0 & 1 & 0
 \end{array} &
 \begin{array}{ccccc}
 8 & 4 & 2 & 1 & \\
 1 & 1 & 0 & 0 &
 \end{array}
 \end{array}$$

Operadores bitwise (parte 2)

Operadores bitwise (parte 2)

• Negação ~
↳ unário

p	~p
1	0
0	1



$$\begin{array}{c}
 \sim 12 \rightarrow \begin{array}{ccccc}
 0 & 0 & 0 & 0 & \\
 \text{128} & \text{64} & \text{32} & \text{16} &
 \end{array} \quad \begin{array}{ccccc}
 1 & 1 & 0 & 0 & \\
 8 & 4 & 2 & 1 &
 \end{array} \\
 \boxed{1111} - \boxed{0011} \\
 \text{8 4 2 1} \\
 \downarrow \\
 -13 \\
 +1
 \end{array}$$

Soma os '0' quando é negativos

Operadores bitwise (parte 3)

Operadores bitwise (parte 3)

>> Right Shift $22 \gg 2 = 5$

$22_{10} \rightarrow (?)$

Diagram illustrating Right Shift (22 >> 2):

Initial value 22 in binary: 10110 (bits 4, 2, 1 are marked). The value is shifted right by 2 positions, resulting in 101 (bits 4, 2, 1 are marked), which is 5 in decimal.

<< Left Shift $22 \ll 2 = 88$

Diagram illustrating Left Shift (22 << 2):

Initial value 22 in binary: 10110 (bits 64, 32, 16, 8, 4, 2, 1 are marked). The value is shifted left by 2 positions, resulting in 1011000 (bits 64, 32, 16, 8, 4, 2, 1 are marked), which is 88 in decimal.

Exercícios

Exercícios de Deslocamento

$35 \gg 4$

5 << 3

Exercícios resolvidos

Exercícios de Deslocamento

$$35 \gg 4 = 2$$

32 16 8 4 2 1
1 0 0 0 1 1
↓
10 = 2
2 1

$5 \ll 3 =$

4 2 1
101000
↓
101000 = 40
32168421

