Exercises

1. Indicate the meaning of the bit sequence 10111011 when interpreted as:

1.1. ASCII character (considering only the seven bits with the lowest weight);

1.2. Unsigned binary number;

1.3. Binary number in 2's complement.

2. Suppose this sequence is stored in a 16-bit register, for which it needs to be extended. For each one of the previous paragraphs, what value (in hexadecimal) should this record have, so that the interpreted value does not change?

3. Represent each one of the decimal numbers -2, +130, -100, +12, -128, +5, -1024, +255, -15, in hexadecimal and 2's complement, with 4, 8 and 16 bits (indicate the cases in which this is not possible).

4. Indicate the largest and the smallest integer representable with 4, 8 and 16 bits, in representation:

4.1. No signal;

4.2. Of module and signal;

4.3. In 2's complement.

5. Calculate the value, in decimal, of the following numbers represented in hexadecimal, 2's complement and with the minimum number of digits required: FH, 8FH, 1C0H, FFFH, 1000H, FEH, FFFFFFF0H, 8000H, 8H, 7FH.

6. How many bits do you need, at least, to represent the decimal number 3456789? Show how you can answer without converting the number to binary.

7. Convert decimal numbers to binary representation in 2's complement with 8 bits and perform the operations in binary, indicating which ones produce an excess situation.

7.1. -32 + 16

7.2. 64 + 70

7.3. -53 – 75

7.4. 50 – 128

7.5. 34 – 15

7.6. 14 × 7

7.7. 16 × (-8) **7.8.** 8 × (23 – 40) **7.9.** -3 × 20 + 10

8. Calculate, in decimal, how many bits are there in 12 KBytes.

9. Use ASCII Code to read the following text: 01000010 01101111 01101101 00100000 01100100 01101001 01100001 00100001.

20H	*espaço*	30H	0	40H	@	50H	P	60H	`	70H	p
21H	!	31H	1	41H	A	51H	Q	61H	a	71H	q
22H	"	32H	2	42H	B	52H	R	62H	b	72H	r
23H	#	33H	3	43H	C	53H	S	63H	c	73H	s
24H	$	34H	4	44H	D	54H	T	64H	d	74H	t
25H	%	35H	5	45H	E	55H	U	65H	e	75H	u
26H	&	36H	6	46H	F	56H	V	66H	f	76H	v
27H	'	37H	7	47H	G	57H	W	67H	g	77H	w
28H	(	38H	8	48H	H	58H	X	68H	h	78H	x
29H	)	39H	9	49H	I	59H	Y	69H	i	79H	y
2AH	*	3AH	:	4AH	J	5AH	Z	6AH	j	7AH	z
2BH	+	3BH	;	4BH	K	5BH	[	6BH	k	7BH	{
2CH	,	3CH	<	4CH	L	5CH	\	6CH	l	7CH	|
2DH	-	3DH	=	4DH	M	5DH	]	6DH	m	7DH	}
2EH	.	3EH	>	4EH	N	5EH	^	6EH	n	7EH	~
2FH	/	3FH	?	4FH	O	5FH	_	6FH	o	7FH	DEL

Codificação ASCII