1. Quantos números (ou grandezas) diferentes podem ser representadas em binário ocupando até 8 bits e 12 bits?

8 bits: 0 – 255 – sem sinal 11111111 //

11111111 (com sinal) : -127

01111111 :127

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 25 | 24 | 23 | 22 | 21 | 20 |
| 32 | 16 | 8 | 4 | 2 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 211 | 210 | 29 | 28 | 27 | 26 |
|  |  |  |  | 128 | 64 |
|  |  |  |  | 1 | 1 |

1. Considere os pares de números binários de 6 bits indicados a seguir. Efetue a operação de soma entre eles supondo que os números estão representados em: (i)Sinal magnitude ( o primeiro bit indica o sinal + ou ); (ii)Complemento a dois.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Número 12 | Número 22 | Numero 1 10 | Número 2 10 | Sinal | Resultado |
| 010101 | 110110 | 21 | 22 | - | 1 00001 |
| 010101 | 010110 | 21 | 22 | + | ? (0 101011) |
| 110101 | 110110 | -21 | -22 | + | ? (1 101011) |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. 32 | 16 | 8 | 4 | 2 | 1 |
| (21) | 1 | 0(1) | 1 | 0 (1) | 1 |
| (+21) | 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 32(1) | 16 | 8 | 4 | 2 | 1 |
| (-21) | 1 | 0(1) | 1 | 0 | 1 |
| (-22) | 1 | 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 | 1 |

(1 101011) -4310

1. Converter os números a seguir de decimal para binário e realizar as operações indicadas utilizando a representação em complemento a 2 ocupando 6 bits.

a) 05 + 12 = 17

b) 13 - 09

c) 17 - 31

d) -12 - 08

e) 10 – 26 = -16

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| +- | 16 | 8 | 4 | 2 | 1 |
| 0 | (1) | 1(1) =0 | 0(1) | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 | 0 |
| Com1 | 0 | 0 | 1 | 0(1) | 1 |
| Com2 |  |  |  |  | 1 |
|  | 0 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 |

5 + 12

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| +- | 16 | 8 | 4 | 2 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| +- | 16 | 8 | 4 | 2 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

-12-8 = -20

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| +- | 16 | 8 | 4 | 2 | 1 |
| 1 | 1 | 1 | 1 | 0 | 0 |
| 1 |  | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 0 |

13-9 =00004 -- 100100

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| +- | 16 | 8 | 4 | 2 | 1 |
| 0 (13) | 0(1) | 1(1) | 1(1) | 0(1) | 1 |
| (9) | 0 | 1 | 0 | 0 | 1 |
|  |  | 0 | 1 | 0 | 0 |
| Compl 1 |  | 0 | 1 | 1 | 0 |
| +1 compl2 |  |  |  |  | 1 |
|  |  | 0 | 1 | 1 | 1 |
|  |  | 0 | 1 | 0 | 0 |

17-31

1+1 = 2 001 + 001 =010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| +- | 24 | 23 | 22 | 21 | 20 |
|  | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |
|  |  |  | 0 | 0 | 1 |
|  |  |  | 0 | 0 | 1 |
|  |  |  | 0 | 1 | 0 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |