**10 .... 0(2)=2^n**

**n**

**1... .... 1(2)= 10.....0(2) -1(2)= 2^n -1**

**n n**

**Integer numbers – codes and operations in complementary code**

**Example 1**

**n=8 bits**

**X=**

**Y=**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **positions** | **S 7 6 5 4 3 2 1 0** | | | | | | | |
| **[] dir = []inv= []compl =** |  |  |  |  |  |  |  |  |
| **[]dir =** |  |  |  |  |  |  |  |  |
| **[]inv =** |  |  |  |  |  |  |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **positions** | **S 6 5 4 3 2 1 0** | | | | | | | |
| **[] dir = []inv= []compl=** |  |  |  |  |  |  |  |  |
| **[]dir =** |  |  |  |  |  |  |  |  |
| **[]inv =** |  |  |  |  |  |  |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |

**[+]compl = []compl  []compl**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **S** | | | | | | | |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  | **** |
| **[]compl =** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

**[]compl = []compl  []compl**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **S** | | | | | | | |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  | **** |
| **[]compl =** |  |  |  |  |  |  |  |  |  |  |
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**[]compl = []compl  []compl**

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|  |  | **S** | | | | | | | |  |  |
| **[]compl** |  |  |  |  |  |  |  |  |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |

**Subunitary numbers – codes and operations in complementary code**

**Example 2**

**n=8 bits**

**X=**

**Y=**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **positions** | **S 7, 6 5 4 3 2 1 0** | | | | | | | |
| **[] dir = []inv= []compl =** |  |  |  |  |  |  |  |  |
| **[]dir =** |  |  |  |  |  |  |  |  |
| **[]inv =** |  |  |  |  |  |  |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **positions** | **S 7, 6 5 4 3 2 1 0** | | | | | | | |
| **[] dir = []inv= []compl=** |  |  |  |  |  |  |  |  |
| **[]dir =** |  |  |  |  |  |  |  |  |
| **[]inv =** |  |  |  |  |  |  |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |

**[+]compl = []compl  []compl**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **S ,** | | | | | | | |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  | **** |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

**[]compl = []compl  []compl**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **S ,** | | | | | | | |  |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  | **** |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

**[]compl = []compl  []compl**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **S ,** | | | | | | | |  |  |
| **[]compl** |  |  |  |  |  |  |  |  |  | **** |  |
| **[]compl =** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

**Example 3: Represent in fixed-point notation, on 32 bits, I=14, the number 3456,78**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**Example 4: Represent in floating point notation, single precision (SP), the number: 3456,78**

**Mantissa<1**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**Mantissa>1**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**Example 5: Find the real number X having C504A800 its fixed-point representation on 32 bits with I=17 bits.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  | | | |  | | | |  | | | |  | | | |  | | | |  | | | |  | | | |  | | | |

**Example 6:** **Find the real number X having C504A800 as its floating-point representation, SP, m>1.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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