**Conversions**

1. **Rapid conversions**
2. **Substitution method**
3. **Successive divisions and multiplications**
4. **Rapid conversions:** conversions between bases which are powers of2.
   1. **Conversion from the source base p=2k , p****{4=22,8=23,16=24} into the destination base 2**

**Rule**:

**Each digit from the source number in base *p*=2*k*, the integer part and the fractional one, will be replaced by the corresponding group of *k* binary digits (adding if it is necessary insignificant zeros to the left).**

* 1. **. Conversion from base 2 into the destination base q=2k** ,  **q{4=22,8=23,16=24}**

**Rules:**

* **for the *integer/fractional part*: from *right/left* to *left/right* (relative to the decimal point) make groups of *k* binary digits (eventually we add to the *left/right* insignificant zeros to have a complete group);**
* **the groups will be replaced by the corresponding digits in base *q*=2*k .***

**Example 1:**

**(8) = ? (2) = ? (16)**

**Example 2:**

**(4) = ? (16)**

**Example 3:**

**(16) = ? (4)**

1. **Substitution method**

* **calculations in the destination base**
* **it is recommended for *b < h*, *b* (source base), *h*(destination base)**

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***Steps:***

* **all the digits from the source representation are converted into the destination base: **
* **the base *b* is converted into base *h*: **
* **we calculate in base *h* the following sum:**

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**Example 4:with a precision of 2 digits at the fractional part in the destination representation**

**, (5) = ,  (8)**

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**Example 5:with a precision of 2 digits at the fractional part in the destination representation**

**, (7) = ,  (16)**

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1. **The method of successive divisions/multiplications**

* **it is recommended for *h < b*, *b* –source base and *h*- destination base.**
* **calculations in the source base**

**Integer part**: **successive divisions** by the destination base (***h***) are performed

* the process of successive divisions ends when 0 is obtained as quotient.
* the remainders, in the reverse order, are the digits of the new representation in base *h.*

**Fractional part**: **successive multiplications** by the destination base (***h***) are performed

* the fractional part is multiplied by ***b*** obtaining a number with an integer part and a fractional one;
* we continue with the multiplication of this new fractional part,...
* the process of the successive multiplications continues until one of the following conditions is satisfied:

a) the fractional part becomes 0;

b) an established number of digits of the fractional part were calculated;

c) periodicity is obtained.

* the integer parts, in the order of obtaining them during the multiplications process, are the digits of the fractional part in the destination representation.

**Example 6: with a precision of 3 digits at the fractional part in the destination representation**

**, (8) = ,  (5)**

**Conversion of the integer part**

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| |  / |  /    /    /  r | |  / |  /    /    /  r | |  / |  /    /    /  r | |  / |  /    /    /  r | |  / |  /    /    /  r |

**Calculations:**

**Conversion of the fractional part**

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| **0,** |  |  | **\*** |  |  |  |  | **\*** |  |  |  |  | **\*** |  |
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**Calculations:**

**Example 7: with a precision of 3 digits at the fractional part in the destination representation**

**, (16) = ,  (7)**

**Conversion of the integer part**

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| |  / |  /    /    /  r | |  / |  /    /    /  r | |  / |  /    /    /  r | |  / |  /    /    /  r | |  / |  /    /    /  r |

**Calculations:**

**Conversion of the fractional part**

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| **0,** |  |  | **\*** |  |  |  |  | **\*** |  |  |  |  | **\*** |  |
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**Calculations:**