

Exercises on the topics of class 2

Exercises with solutions

Ex. 1. Turn in base 7 the natural number 33201_4 .

SOLUTION:

First of all, let's turn 33201_4 in base 10:

$$3 \times 4^4 + 3 \times 4^3 + 2 \times 4^2 + 0 \times 4^1 + 1 \times 4^0 = 3 \times 256 + 3 \times 64 + 2 \times 16 + 1 = 993$$

We then turn 993 in base 7:

$$993 / 7 = 141 \text{ rem. } 6$$

$$141 / 7 = 20 \text{ rem. } 1$$

$$20 / 7 = 2 \text{ rem. } 6$$

$$2 / 7 = 0 \text{ rem. } 2$$

Hence, the required number is 2616_7 .

Ex. 2. Turn the natural number 320012_4 in the corresponding binary and hexadecimal number.

SOLUTION:

The simplest way to turn a number from base 4 into the corresponding number in base 2 is to translate every digit in base 4 in a 2-bit binary number and to concatenate the results. Hence, 320012_4 becomes 111000000110_2 .

Passing to base 16 is conceptually similar: we take pairs of digits in base 4, from the less significant to the most significant digit, being $16 = 4^2$. In doing this, you have to remember that you're working in base 4!! Hence, 320012_4 becomes $E06_{16}$; indeed, $32_4 = 3 \times 4 + 2 = 14 = E_{16}$ and $12_4 = 1 \times 4 + 2 = 6 = 6_{16}$.

Exercises without solutions

Ex. 1. Turn 277 from base 10 to base 2, 4, 8 and 16.

Ex. 2. Turn AD04 from base 16 to base 2, 4 and 7.