Number system conversions

CS230 Tutorial 01

Converting TO Decimal

The index of position of a digit represents the power of the base it must be multiplied by during conversion.

REMEMBER: indices start at 0.

Exercise 1: Convert the following to decimal.

a. 10110110 (base 2, binary)
b. 34106 (base 7)
c. 1D4FA (base 16, hexadecimal)

Solutions:
a. 182_{10}
b. 8630_{10}
c. $120\ 058_{10}$

Converting FROM Decimal

Repeated long division by the base. That is all.

REMEMBER: the difference between quotient and remainder.

Exercise 2: Convert 4128 from decimal, to…

a. Base 2 (binary)
b. Base 4
c. Base 16 (hexadecimal)

Solutions:
a. 1000000100000_2
b. 1000200_4
c. 1020_{16}

Converting from binary to hex

Here consider the binary numbers in sets of 4: each 4 digits represents one hex digit.

Exercise 3: Convert the following from binary to hexadecimal.

a. 1011
b. 110010011010
c. 100111101

Solutions:
a. B_{16}
b. $C9A_{16}$
c. $13D_{16}$

Converting from hex to binary

This is the logical opposite of converting from binary to hex: each hex digit represents 4 binary digits.

Exercise 4: Convert the following from hexadecimal to binary.

a. 0x1A4
b. 0x58C7
c. 0xFD09

Solutions:
a. 110100100_2
b. 1011000110000111_2
c. 1111110100001001_2