Digital technology

Numbering systems

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Numbering systems

Binary number conversions

- Big decimal numbers are difficult to present in binary format
  - The number of characters increases significantly

  E.g. 9765_{10} in binary format is 10011000100101_2
- Octal and hexadecimal formats are preferred
- Conversion from binary to octal or hexademical system is easy
  - The binary digit's bits, i.e. single characters are grouped into three- (octal system) or four-bit groups (hexadecimal system)
  - These groups are converted into their own characters

OCTAL	HEXA	BINARY	BINARY16
0	0	000	0000
1	1	001	0001
2	2	010	0010
3	3	011	0011
4	4	100	0100
5	5	101	0101
6	6	110	0110
7	7	111	0111
	8		1000
	9		1001
	A		1010
	B		1011
	C		1100
	D		1101
	E		1110
	F		1111

Numbering systems

Examples of binary number conversions.

01101011_2 --> X_8

001 101 011

1 5 3 eli 01101011_2 --> 153_8

743_8 --> X_2

7 4 3

111 100 011 eli 743_8 --> 111100011_2

01101011_2 --> X_{16}

0110 1011

6 B eli 01101011_2 --> $6B_{16}$

Exercises

3. Convert

a) 101100_2 -->X_8

b) 010110111010_2 --> X_{16}

c) 736_8 --> X_2

d) 634_8 --> X_{16}

e) $9F7_{16}$ --> X_2

f) ABC_{16} --> X_8