

Quiz Tues Jan 16th Section 1.2

Test 1

Not Open Book

Wed Jan 31

1.1-1.5, 2.1-2.3 (tentative)

1.5 Converting Between Binary, Octal and Hexadecimal

In this section, all bases are powers of 2.

Octal	Binary
0_8	000_2
1_8	001_2
2_8	010_2
3_8	011_2

Octal	Binary
4_8	100_2
5_8	101_2
6_8	110_2
7_8	111_2

$$634_8 = 110\ 011\ 100_2$$

Blocks of 3
digits

Ex: Convert to binary

$$\begin{aligned} \text{a) } 15_8 &= 001\ 101_2 \\ &= 1\ 101_2 \end{aligned}$$

Can drop leading zeros in an integer.

$$\begin{aligned} \text{b) } 703_8 & \\ &= 111\ 000\ 011_2 \end{aligned}$$

$$\begin{aligned} \text{c) } 42.62_8 & \\ &= 100\ 010.110\ 010_2 \\ &= 100\ 010.110\ 01_2 \end{aligned}$$

Can drop trailing zeros in a non-integer.

$$\begin{aligned} \text{d) } 2.4_8 & \\ &= 010.100_2 \\ &= 10.1_2 \end{aligned}$$

$\begin{aligned} 017 &= 17 \\ 10 &\neq 1 \\ 10.20 &= 10.2 \\ 0.03 &\neq 0.3 \end{aligned}$
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Ex: Convert to octal

$$\begin{aligned} \text{a) } 10101110_2 & \\ &= \underline{010}\ 101\ 110_2 \\ &= 2\ 5\ 6_8 \end{aligned}$$

$$\begin{aligned}
 \text{b) } & \underline{1010} \cdot \underline{110}_2 \\
 & = 001 \ 010 \cdot 110_2 \\
 & = 1 \ 2 \cdot 6_8
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } & 0.\underline{10101}_2 \\
 & = 0.101 \ 010_2 \\
 & = 0.52_8
 \end{aligned}$$

Hexadecimal	Binary
0_{16}	0000_2
1_{16}	0001_2
2_{16}	0010_2
3_{16}	0011_2
4_{16}	0100_2
5_{16}	0101_2
6_{16}	0110_2
7_{16}	0111_2

Hexadecimal	Binary
8_{16}	1000_2
9_{16}	1001_2
A_{16}	1010_2
B_{16}	1011_2
C_{16}	1100_2
D_{16}	1101_2
E_{16}	1110_2
F_{16}	1111_2

Blocks of 4 digits

Ex: Convert to binary

$$\begin{aligned}
 \text{a) } & 94_{16} \\
 & = 1001 \ 0100_2
 \end{aligned}$$

$$b) \text{ FAB}_{16} \\ = 1111 \ 1010 \ 1011_2$$

$$c) \ 2.E_{16} \\ = 0010.1110_2 \\ = 10.111_2$$

Ex: Convert to hexadecimal:

$$11.01_2 \\ = 0011.0100_2 \\ = 3.4_{16}$$

To convert between octal and hexadecimal, convert to binary first.

Ex: a) $705_8 \rightarrow$ hexadecimal

$$= 111 \ 000 \ 101_2 \\ = 0001 \ 11 \ 00 \ 0101_2 \\ = 1 \ C \ 5_{16}$$