

Series: Mathematics - from zero to engineer (14)

Review exercises

Express the following numbers in the decimal number system.

a) $1110_2 = 14,75_{10}$

$$\begin{array}{r} 1 \\ \cdot 2 \\ \hline 2 \end{array} \quad \begin{array}{r} 1 \\ + 2 \\ \hline 3 \\ \cdot 2 \\ \hline 6 \end{array} \quad \begin{array}{r} 1 \\ + 6 \\ \hline 7 \\ \cdot 2 \\ \hline 14 \end{array} \quad \begin{array}{r} 0 \\ + 14 \\ \hline 14 \end{array} \quad \begin{array}{r} 1 \\ \cdot 2 \\ \hline 2 \end{array} \quad \begin{array}{r} 1 \\ + 2 \\ \hline 3 \end{array}$$

$$3 \cdot 2^{-2} = 3 \cdot \frac{1}{4} = \frac{3}{4} = 0,75$$

b) $507,632_8 = 327,801_{10}$

$$\begin{array}{r} 5 \\ \cdot 8 \\ \hline 40 \end{array} \quad \begin{array}{r} 0 \\ + 40 \\ \hline 40 \\ \cdot 8 \\ \hline 320 \end{array} \quad \begin{array}{r} 7 \\ + 320 \\ \hline 327 \\ \cdot 8 \\ \hline 2616 \end{array} \quad \begin{array}{r} 6 \\ \cdot 8 \\ \hline 48 \end{array} \quad \begin{array}{r} 3 \\ + 48 \\ \hline 51 \\ \cdot 8 \\ \hline 408 \end{array} \quad \begin{array}{r} 2 \\ + 408 \\ \hline 410 \end{array}$$

$$410 \cdot 8^{-3} = 410 \cdot \frac{1}{512} = \frac{410}{512} = 0,801$$

c) $345,2\Lambda 7_{12} = 485,247_{10}$

$\Lambda = 11$

$$\begin{array}{r} 3 \\ \cdot 12 \\ \hline 36 \end{array} \quad \begin{array}{r} 4 \\ + 36 \\ \hline 40 \\ \cdot 12 \\ \hline 480 \end{array} \quad \begin{array}{r} 5 \\ + 480 \\ \hline 485 \\ \cdot 12 \\ \hline 5820 \end{array} \quad \begin{array}{r} 2 \\ \cdot 12 \\ \hline 24 \end{array} \quad \begin{array}{r} 11 \\ + 24 \\ \hline 35 \\ \cdot 12 \\ \hline 420 \end{array} \quad \begin{array}{r} 7 \\ + 420 \\ \hline 427 \end{array}$$

$$427 \cdot 12^{-3} = 427 \cdot \frac{1}{1728} = \frac{427}{1728} = 0,247$$

d) $2B4,CA3_{16} = 692,790_{10}$

$A = 10$

$B = 11$

$C = 12$

$$\begin{array}{r} 2 \\ \cdot 16 \\ \hline 32 \end{array} \quad \begin{array}{r} 11 \\ + 32 \\ \hline 43 \\ \cdot 16 \\ \hline 688 \end{array} \quad \begin{array}{r} 4 \\ + 688 \\ \hline 692 \\ \cdot 16 \\ \hline 11072 \end{array} \quad \begin{array}{r} 12 \\ \cdot 16 \\ \hline 192 \end{array} \quad \begin{array}{r} 10 \\ + 192 \\ \hline 202 \\ \cdot 16 \\ \hline 3232 \end{array} \quad \begin{array}{r} 3 \\ + 3232 \\ \hline 3235 \end{array}$$

$$3235 \cdot 16^{-3} = 3235 \cdot \frac{1}{4096} = \frac{3235}{4096} = 0,790$$

Express $427,362_{10}$ in duodecimal form.

$\begin{array}{r} 427 : 12 \\ 35 : 12 \\ 2 : 12 \\ 0 \end{array}$	remaining $\begin{array}{c} \uparrow 7 \\ 11 \\ 2 \end{array}$	$\begin{array}{r} 0,362 \cdot 12 \\ 4,344 \cdot 12 \\ 4,128 \cdot 12 \\ 1,536 \cdot 12 \\ 6,432 \end{array}$	$427,362_{10} = 2\Lambda 7,442_{12}$
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Convert $139,825_{10}$ to its equivalent forms in the octal, binary and hexadecimal systems.

$$139,825_{10} = 213,646_8 = 10001011,110100110_2 = 8B,D3_{16}$$

139 : 8
17 : 8
2 : 8
0

remaining

↑ 3
1
2

0,825 · 8
6,600 · 8
4,800 · 8
6,400 · 8
3,200



010 001 011 , 110 100 110
2 1 3 6 4 6
0000 1000 1011, 1101 0011 0000
0 8 11 13 3 0
B D