

Conversion from binary to decimal

$$1_2 = 1_{10}$$

$$10_2 = 2_{10}$$

$$100_2 = 4_{10}$$

$$1000_2 = 8_{10}$$

例 1 2進数 1010_2 を 10進数に変換せよ。

問 1 次の 2進数を 10進数に変換せよ。

(1) 10001_2

(2) 101010_2

(3) 100011_2

Binary Calculation

$$0 + 0 = 0$$

$$1 + 0 = 1$$

$$1 + 1 = 10$$

例 2 Perform the following binary calculations.

$$\begin{array}{r} 11 \\ +) 01 \\ \hline \end{array}$$

問 2 Perform the following binary calculations.

(1)

$$\begin{array}{r} 101 \\ +) 10 \\ \hline \end{array}$$

(2)

$$\begin{array}{r} 111 \\ +) 101 \\ \hline \end{array}$$

(3)

$$\begin{array}{r} 1010 \\ +) 110 \\ \hline \end{array}$$

(4)

$$\begin{array}{r} 1110 \\ +) 111 \\ \hline \end{array}$$

例 3 Convert the decimal number 11 to binary.

問 2 Convert the decimal number 19 to binary.

Conversion from binary to decimal

$$1_2 = 1_{10}$$

$$10_2 = 2_{10}$$

$$100_2 = 4_{10}$$

$$1000_2 = 8_{10}$$

例 1 2進数 1010_2 を 10進数に変換せよ。

$$\begin{aligned} 1010_2 &= 1000_2 + 10_2 \\ &= 2^3 + 2^1 \\ &= 8 + 2 \\ &= 10 \end{aligned}$$

問 1 次の 2進数を 10進数に変換せよ。

(1) 10001_2

$$\begin{aligned} 10001_2 &= 10000_2 + 1_2 \\ &= 2^4 + 2^0 \\ &= 16 + 1 \\ &= 17 \end{aligned}$$

17_{10}

(2) 101010_2

$$\begin{aligned} 101010_2 &= 100000_2 + 1000_2 + 10_2 \\ &= 2^5 + 2^3 + 2^1 \\ &= 32 + 8 + 2 \\ &= 42 \end{aligned}$$

42_{10}

(3) 100011_2

$$\begin{aligned} 100011_2 &= 100000_2 + 10_2 + 1_2 \\ &= 2^5 + 2^1 + 2^0 \\ &= 32 + 2 + 1 \\ &= 35 \end{aligned}$$

35_{10}

Binary Calculation

$$0 + 0 = 0$$

$$1 + 0 = 1$$

$$1 + 1 = 10$$

例 2 Perform the following binary calculations.

$$\begin{array}{r} 11 \\ +) 01 \\ \hline 100 \end{array}$$

問 2 Perform the following binary calculations.

(1)

$$\begin{array}{r} 101 \\ +) 10 \\ \hline 111 \end{array}$$

(2)

$$\begin{array}{r} 111 \\ +) 101 \\ \hline 1100 \end{array}$$

(3)

$$\begin{array}{r} 1010 \\ +) 110 \\ \hline 10000 \end{array}$$

(4)

$$\begin{array}{r} 1110 \\ +) 111 \\ \hline 10101 \end{array}$$

例 3 Convert the decimal number 11 to binary.

$$\begin{array}{r} 2) 22 \cdots 0 \\ 2) 11 \cdots 1 \\ 2) 5 \cdots 1 \\ 2) 2 \cdots 0 \\ \hline 1 \end{array}$$

$$\begin{aligned} 22 &= 2^4 + 0 + 2^2 + 2^1 + 0 \\ &= 10110_2 \end{aligned}$$

10110_2

問 2 Convert the decimal number 19 to binary.

$$\begin{array}{r} 2) 19 \cdots 1 \\ 2) 9 \cdots 1 \\ 2) 4 \cdots 0 \\ 2) 2 \cdots 0 \\ \hline 1 \end{array}$$

$$\begin{aligned} 22 &= 2^4 + 0 + 0 + 2^1 + 1 \\ &= 10011_2 \end{aligned}$$

10011_2