Binario, altre basi e rappresentazioni

Esercizio 1

- $101110_2 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 32 + 0 + 8 + 4 + 2 + 0 = 46_{10}$
- $100001_2 = 1 \times 2^5 + 1 \times 2^0 = 33_{10}$
- $110111101_2 = 1 \times 2^8 + 1 \times 2^7 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^0 = 445_{10}$

Esercizio 2

- $1670_8 = 1 \times 8^3 + 6 \times 8^2 + 7 \times 8^1 + 0 \times 8^0 = 512 + 384 + 56 = 952_{10}$
- $1043_8 = 1 \times 8^3 + 4 \times 8^1 + 3 \times 8^0 = 547_{10}$
- $25012_8 = 2 \times 8^4 + 5 \times 8^3 + 1 \times 8^1 + 2 \times 8^0 = 10762_{10}$

Esercizio 3

- $11F_{16} = 1 \times 16^2 + 1 \times 16^1 + 15 \times 16^0 = 256 + 16 + 15 = 287_{10}$
- $4CD_{16} = 4 \times 16^2 + 12 \times 16^1 + 13 \times 16^0 = 1229_{10}$
- $10043_{16} = 1 \times 16^4 + 4 \times 16^1 + 3 \times 16^0 = 65603_{10}$

Esercizio 4

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$$\begin{array}{rr} 10001+ & 17+ \\ 1110 = & 14 = \\ 11111 & 31_{10} \end{array}$$

-
$$\begin{array}{rr} 100^1 1^1 1^1 1^1 0^1 1+ & 77 \\ 111 = & 7 \\ 1010100 & 84_{10} \end{array}$$

Esercizio 5

- $110110_{c2} = 1 \times -2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = -32 + 16 + 4 + 2 = -10_{10}$
- $01011_{c2} = 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^1 + 1 \times 2^0 = 11_{10}$
- $11110001_{c2} = 1 \times -2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^0 = -15_{10}$

Esercizio 6

- $010101_{e128} = 21 - 128 = -107$
- $1101_{e16} = 13 - 16 = -3$
- $111100010_{e64} = 482 - 64 = 418$

Circuiti logici e algebra di Boole

Esercizio 7

Si veda `logisim/exercise07_solution.cisc`

Esercizio 8

$$
\begin{aligned}
f &= \neg(x \vee (w \wedge z) \vee (x \wedge \neg y)) && \text{raccoglimento} \\
&= \neg(x \wedge (1 \vee \neg y) \vee (w \wedge z)) && 1 \vee \neg y = 1 \\
&= \neg(x \vee (w \wedge z)) && \text{De Morgan} \\
&= \neg x \wedge \neg(w \wedge z) = \neg(x \wedge w \wedge z) && \text{De Morgan} \\
&= \neg x \wedge (\neg w \vee \neg z)
\end{aligned}
$$