

normalized floating point numbers

base: $b \in \mathbb{N}, b \geq 2$, mantissa length $t \in \mathbb{N}$, exponent $e \in \mathbb{Z}$

general form:¹

$$\underbrace{\pm}_{\text{sign}} \underbrace{0.a_1 a_2 \dots a_t}_{\text{mantissa}} \cdot b^e, \quad a_1, \dots, a_t \in \{0, 1, \dots, b-1\}, \quad a_1 \neq 0, \quad e \in \mathbb{Z},$$

explicitly:

$$\pm (a_1 b^{-1} + a_2 b^{-2} + \dots + a_t b^{-t}) b^e$$

- **example:** $x = 7/2 = 3.5$ in decimal system ($b = 10$) with mantissa length 4:

$$x = +0.3500 \cdot 10^1$$

- **example:** $x = 7/2 = 3.5$ in binary system ($b = 2$) with mantissa length 6:

$$x = +0.111000 \cdot 2^2$$

¹of a floating point number $\neq 0$