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Programming and Data Structures with Python

Python

Numbers

int $\equiv \mathbb{Z}$ ..., -2, -1, 0, +1, +2, ...

float $\equiv \mathbb{Q}$

$\mathbb{Z} \subseteq \mathbb{Q}$

int $\Rightarrow$ binary expansion of n

float $x.y = xy \times 2^m$ – large & small nos

int 17 → 16+1 → 0 10001

4 3 2 1 0

sign

-17? 1 10001

5 bits + sign

+31

-31

0 → +0 00000

-0 100000 ?

"2's complement" $2^6 - n$ represents $-n$

-5 :

$$\begin{array}{r} 100000 \\ -\ 000101 \\ \hline 111011 \end{array} \qquad 2^6$$

$$\begin{array}{r} 100000 \\ 011111 \\ \hline 100001 \end{array} \qquad \begin{array}{l} 2^n \\ -31 \end{array}$$

$$\begin{array}{r} 100000? \\ +1 \qquad\quad 1 \\ \hline 100001 \end{array} \qquad = -32 \qquad = -31$$

-31 — $+31$

-32

Fixed width to store a number

32 bit, 64 bit ..

32 bits = 1 + 31

$-2^{31} - (2^{31}-1)$

$2^{63}-1$

$2^{10} = 1024 \approx 10^3$

$2^{20} \approx 10^6$

$2^{60} \approx 10^{18}$

$-2^5 - (2^5-1)$

-32 $+31$

10^6 = 1 million

10^9 = 1 billion

Float