2024_09_23

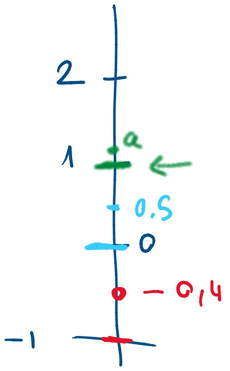
lunedì, 23 settembre 2024 14:16

Floor function

$\lfloor \pi \rfloor = \lfloor 3.14159 \rfloor = \lfloor 3{,}1 \rfloor = 3$

$\lfloor 2 \rfloor = 2$

$\lfloor 1.99 \rfloor = 1$



$\lfloor a \rfloor = 1$

$\lfloor 0.5 \rfloor = 0$

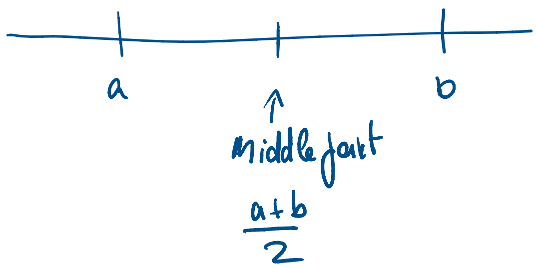
$\lfloor -0{,}4 \rfloor = -1$

$\underset{\text{for all}}{\forall}\ x \underset{\text{in}}{\in} \mathbb{R}$

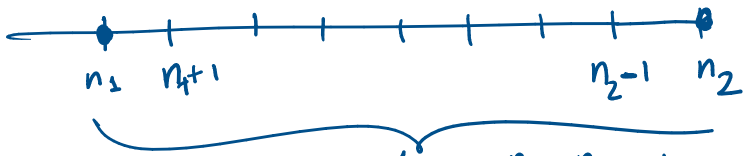
$\lfloor x \rfloor := \{ n \in \mathbb{Z} \mid \underset{\text{biggest } n}{n \leq x} \}$ = n integer such that $n \leq x$, n as big as possible.

Middle point

$a, b \in \mathbb{R}$



Number of integers in an interval with end points



we have $n_2 - n_1 + 1$ integers.

$\sqrt{n} = n^{\frac{1}{2}} \in O(n^{1-\varepsilon})$ for $\varepsilon > 0$

example $\varepsilon = \frac{1}{2}$

2. $T(n) = \Theta\left(n^{\log_b a} \ln n\right)$ *if* $f(n) = \Theta\left(n^{\log_b a}\right)$.

ex. for $b = a = 2$ | $\log_2 2 = 1$

this means

$T(n) = \Theta(n \ln n)$ if $f(n) = \Theta(n)$

Exercise 6 *Work out the computational complexity of the following piece of code:*

```
Algorithm
  for i = n to 1 do
    for j = 1 to n do
      for k = 0 to n do
        ... // constant number of operations
        k = k + 2
      end for
      j = j * 2
    end for
    i = i / 2
  end for
```

$\log_2 n$ $\quad L_3$ $\quad c_1$, c_2 $\Big\}$ $\frac{n}{2}$-times $\quad (c_1+c_2)\cdot\frac{n}{2}$

$$\underbrace{1 \quad 2 \quad 4 \quad 8 \quad 16 \quad \ldots \quad n}_{\cong \log_2 n} \qquad \underbrace{n \quad \frac{n}{2} \quad \frac{n}{4} \quad \ldots \quad 1}_{\log_2 n}$$

$$L_2 = L_3 \cdot \log_2 n$$

$$L_1 = L_2 \cdot \log_2 n = L_3 \cdot \log_2 n \cdot \log_2 n$$