$$\lim_{x \to p} (\cos x - \cos p) = 0$$

Pois

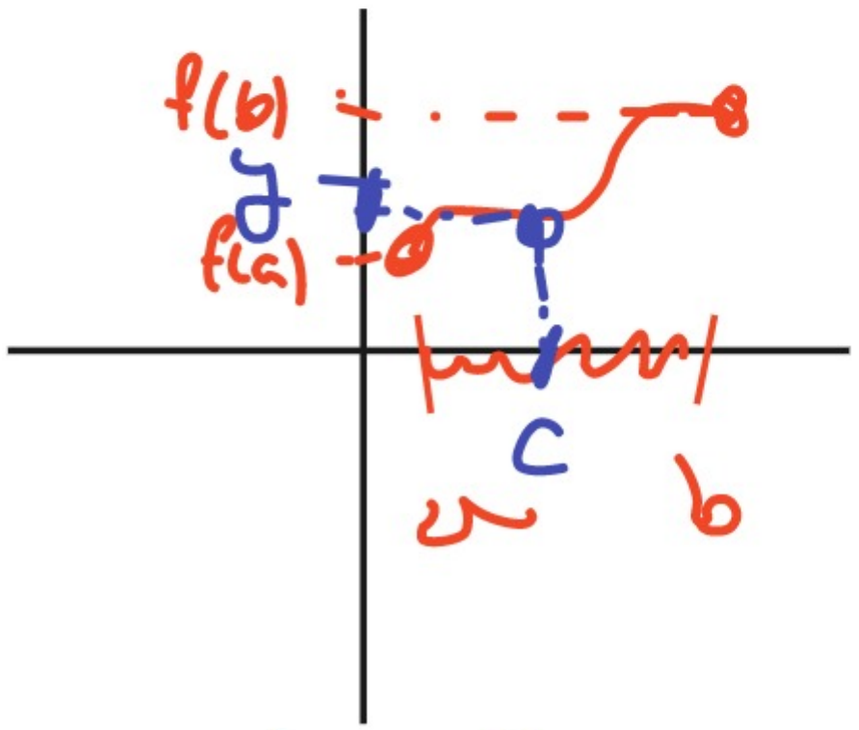
$$\lim_{x \to p} \cos x = \cos p$$

Pelo TVI

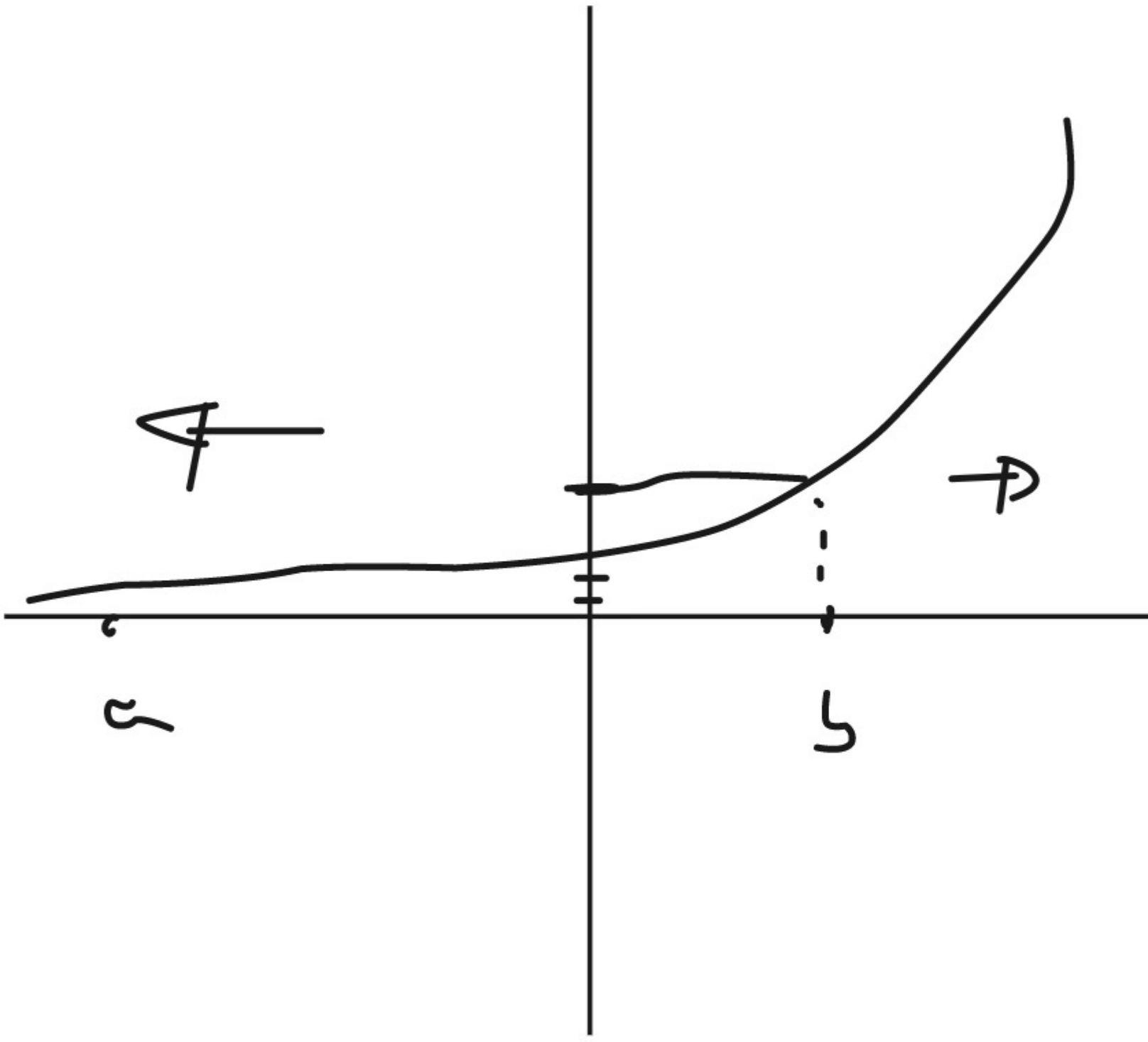
$\forall\, c \in]-\infty, +\infty[$

$0 < f(c) < +\infty$

$\therefore \quad \mathrm{Im}(e^x) =]0, +\infty[$



$\exists c \in]a,b[\;:\; f(c) = y$

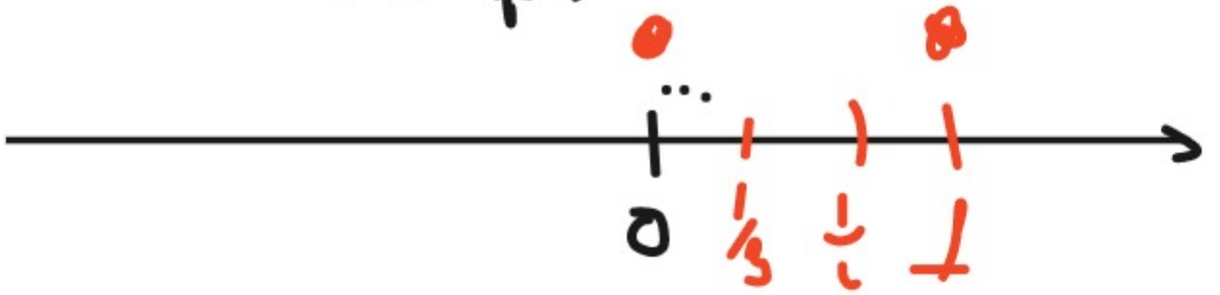


$f(a) < y < f(b)$

$\lim_{x \to -\infty} e^x = 0$ $\lim_{x \to +\infty} e^x = +\infty$

$[a, b]$

Extra (Seq)



$(a_n)_{n \in \mathbb{N}}$

$a_n = 1/n \qquad n \in \mathbb{N}$

$a_n \xrightarrow{n \to \infty} 0$

$$b_n = \begin{cases} 0 & \text{Se } n \text{ é par} \\ 1 & \text{Se } n \text{ é impar} \end{cases}$$

Não usar

$1 \rightsquigarrow 2 \rightsquigarrow 3$

$$\sum_{k=1}^{n} k \cdot \binom{k}{n} = n\,2^{n-1}$$

$n = 1$ ✓

"$\rightsquigarrow$ = ?"

Se vale la igualdad para n fijo

Será que vale

P/ n+1 ?

(princípio da

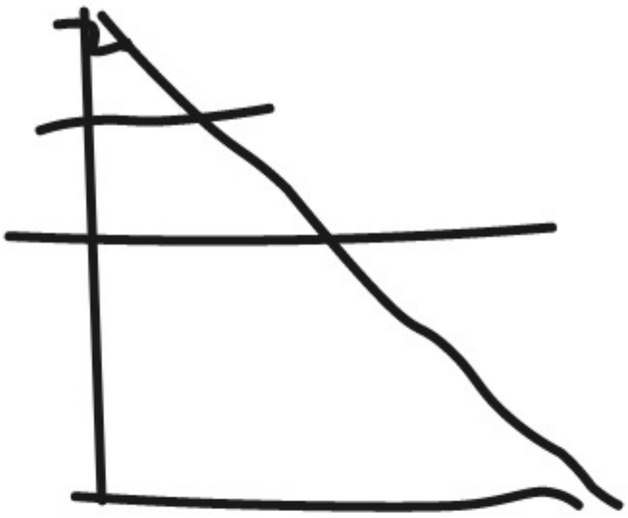
indução finita)

$$\sum_{k=1}^{n+1} k \binom{k}{n+1} \longmapsto \text{trocado}$$

$$= \sum_{k=1}^{n+1} k \cdot \left(\binom{n}{k} + \binom{n}{k-1} \right)$$

$$= \sum_{k=1}^{n} k \cdot \binom{n}{k} +$$

$$\sum_{k=1}^{n+1} k \cdot \binom{n}{k-1}$$



$\underline{1} = 2^6$

$1 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

2^1

$1 + 1 \rightarrow \begin{pmatrix} 1 \\ 0 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

2

1 2 1 4

1 3 3 1

1 4 6 4 1

$$= n \cdot 2^{n-1}$$

$$+ \left(\binom{n}{0} + \sum_{i=1}^{n} (i+1) \cdot \binom{n}{i} \right.$$

$$= n \cdot 2^{n-1} + \binom{n}{0}$$

$$+ \sum_{i=1}^{n} i \cdot \binom{n}{i} + \sum_{i=1}^{n} \binom{n}{i}$$

$$= n \cdot 2^{n-1} + n \cdot 2^{n-1}$$

$$\rightarrow + \sum_{i=0}^{n} \binom{n}{i} \rightarrow 2^n$$

$$= n \cdot 2^{n-1} + n \cdot 2^{n-1}$$

$$+ 2^n$$

$$= (n+1) 2^n$$

$$= (n+1) \cdot 2^{(n+1)-1}$$