

$$x^4$$

$$\lim_{x \rightarrow 0} \left(\frac{5 + x^2}{x^3} \right)$$



$$x \rightarrow 0^+$$



$$\lim_{x \rightarrow 0^+} x^4 = 0$$

$$x^4 \rightarrow 0 \text{ pelo } x \rightarrow 0^+$$

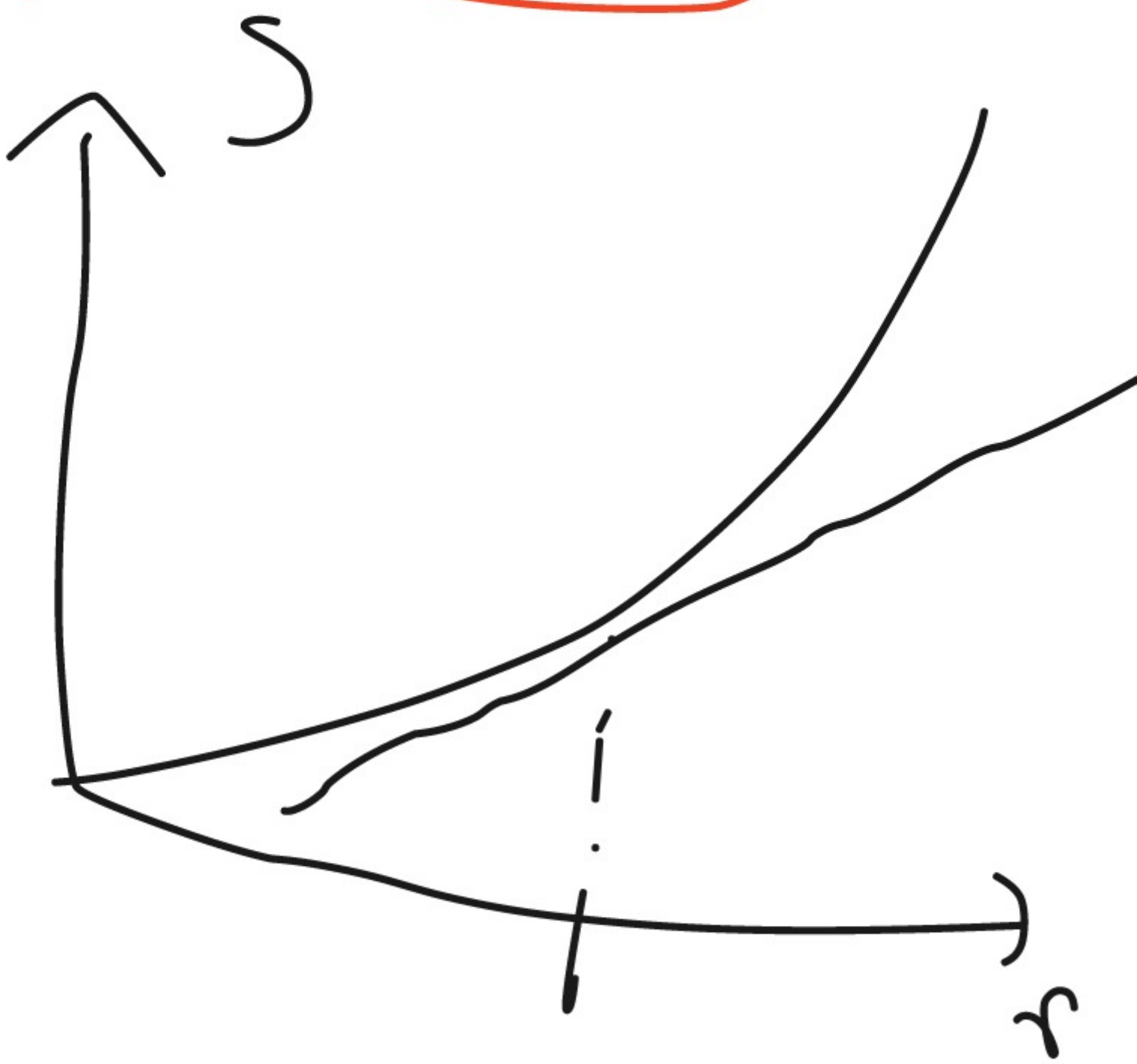
e $\lim_{x \rightarrow 0} \left(\frac{5 + x^2}{x^3} \right)$ é limitado

ent $\bar{A}0$

$$\lim_{x \rightarrow 0^+} x^4 \ln \left(\frac{5+x^2}{23} \right) = 0$$

ET 1213 (2)

$$S = 4\pi r^2$$



a)

$$\frac{dS}{dr} = S'(r)$$

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$$2.4. \pi \cdot \sqrt{\quad}$$

b) Variabel t
(tempo)

$$\frac{d(4\pi r^2)}{dt} = \textcircled{*}$$

$$4\pi r^2 \cdot r'$$

Constante

P / A VARIACÃO
em t

. ° r

* = 0

$$\lim_{x \rightarrow 0} \frac{x^2 \sin(1/x)}{\ln(1+x)}$$

$$\ln(1+x)$$

$$\log_e(1+x) = ?$$

$$\log_e 1 = 0$$

$$\lim_{x \rightarrow 0} \frac{x \sin(1/x)}{\ln(1+x)}$$

$$= \lim_{x \rightarrow 0} \frac{x \sin(1/x)}{\ln[(1+x)^{1/x}]}$$

$$\lim_{x \rightarrow 0} \ln \left[(1+x)^{\frac{1}{x}} \right]$$

$$x \rightarrow 0$$

$$\underbrace{(1+x)^{1/x}}_t \rightarrow e$$

$$\lim_{t \rightarrow e} \ln(t)$$

$$t \rightarrow e$$

"

$$\ln(e) = \underline{1}$$

$$\lim_{x \rightarrow 0} \frac{x^2 \sin(1/x)}{\ln(1+x)}$$

||
0

5)

$$\lim_{x \rightarrow +\infty} (2^x - 3^x)$$

$$(2^x - 3^x)$$

$$= \lim_{x \rightarrow +\infty} 3^x \left(\frac{2^x}{3^x} - 1 \right)$$

$$3^x \left(\frac{2^x}{3^x} - 1 \right)$$

$$\left(\left(\frac{2}{3} \right)^x - 1 \right)$$

↪ 0

$$= +\infty \cdot (-1)$$

$$= -\infty$$

$$\lim 3^x \quad \lim \left(\left(\frac{2}{3} \right)^x - 1 \right)$$

||

$\cdot \infty$