

1. Exergol.

2. Shykh

3. Lanytford



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$$\begin{aligned} & x_3 \geq x_2 \\ & 2. x_n \leq y_n \\ & 3. y_n - x_n \rightarrow 0 \end{aligned}$$

Diagram illustrating a sequence of points $x_1, x_2, \dots, x_{10}, x_{15}$ and corresponding intervals $J_1, J_2, \dots, J_{10}, J_{15}$. The points are marked on a horizontal line, and the intervals are indicated by brackets below the line. The intervals $J_1, J_2, \dots, J_{10}, J_{15}$ are shown as nested or overlapping segments. The diagram also includes a vertical line segment labeled J_1 and a point x_1 .

x_7

$\Rightarrow \rightarrow 0$

$x_7 < y_7$


$$\frac{1}{x} \rightarrow 0$$
 $0 > 0$

X_7

X₂

$$X_n < y_n \leq y_1$$

~~Handwritten scribbles and lines~~

$X_n \rightarrow$ 

$$X_1 \leq X_n \leq y_n$$

$$y_n \geq X_1$$

$$\begin{matrix} X_n & y_n \\ y_1 & \geq y_n \end{matrix}$$

~~Handwritten scribbles and lines~~

$$y_n \rightarrow c'$$

$$0 = \lim_{n \rightarrow \infty} (y_n - x_n)$$

$$= \lim_{n \rightarrow \infty} y_n - \lim_{n \rightarrow \infty} x_n = c' - c$$

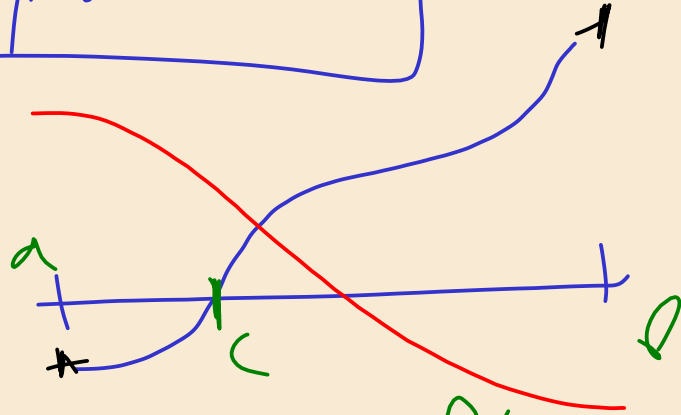
$$0 = c - c' \Rightarrow c' = c$$

$$Q_n \rightarrow 0$$

int. vol. t_{ps} .

f_1, f_2, \dots, f_n

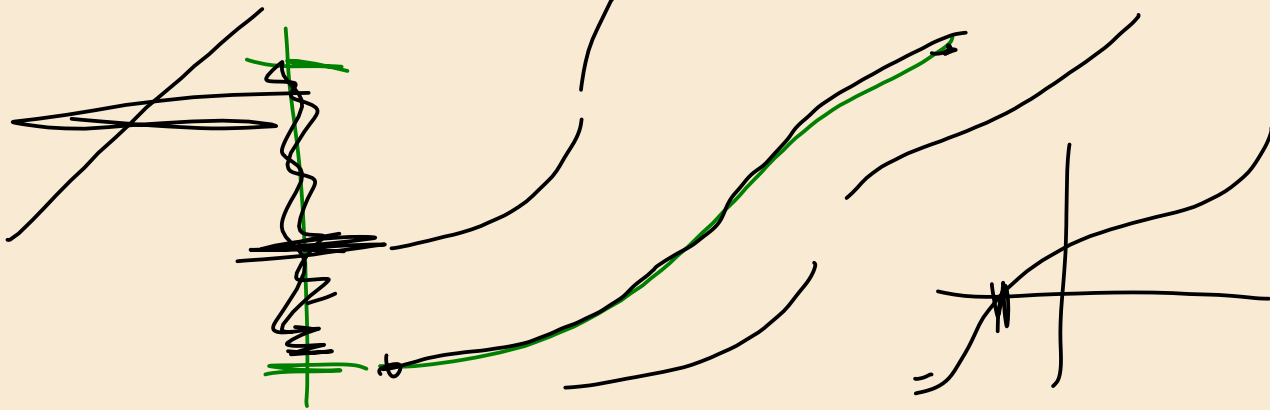
f $C_{0,0}$



$$f(c) < 0$$

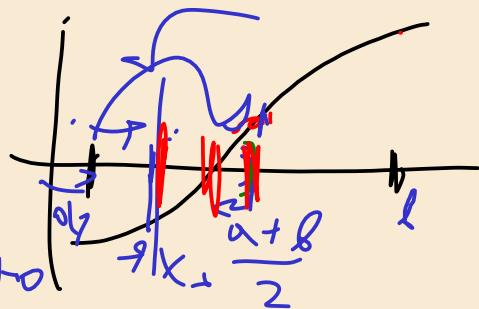
$$f(l) > 0$$

$$f(c) = 0$$



$$f(a) < 0$$

$$f(b) > 0$$



$$[a, b]$$

$$a_n \dots f(x_n) > 0$$

$$f(x_0) = 0$$

$$f(x_n) < 0$$

$$[a_1, b_1] \quad [a_n, b_n]$$

$$\begin{aligned} a_n &< b_n \\ a_n &\nearrow; b_n \searrow \\ b_n - a_n &\rightarrow 0 \end{aligned}$$

$$\lim_{n \rightarrow \infty} c_n =$$

$$\lim_{n \rightarrow \infty} \varphi_n = \lim_{n \rightarrow \infty} \varphi_n \cdot 0$$

$$a_1, x_0$$

$$x_0, b$$

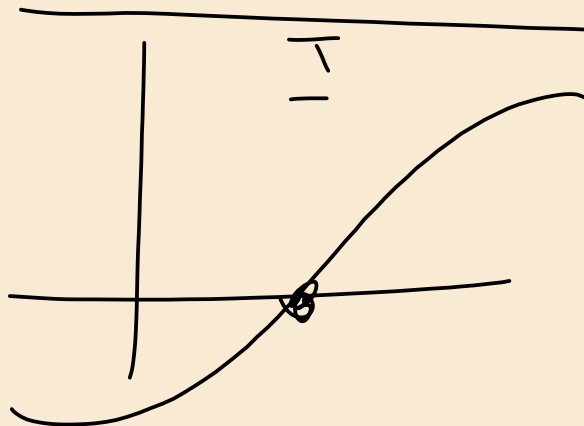
$$b_n - a_n = \frac{b-a}{2^n} \rightarrow 0$$

$$b_2 - a_2 = \frac{b-a}{2^2}$$

$$f(a) = 0$$

$$a_n \rightarrow 0$$

$$\begin{aligned} a_n &< 0 \\ b_n &> 0 \end{aligned}$$

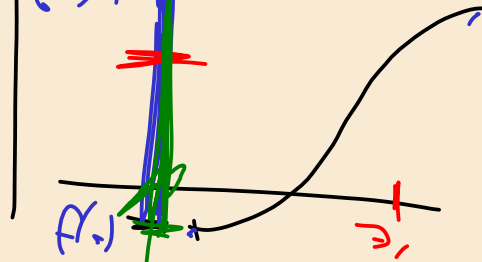


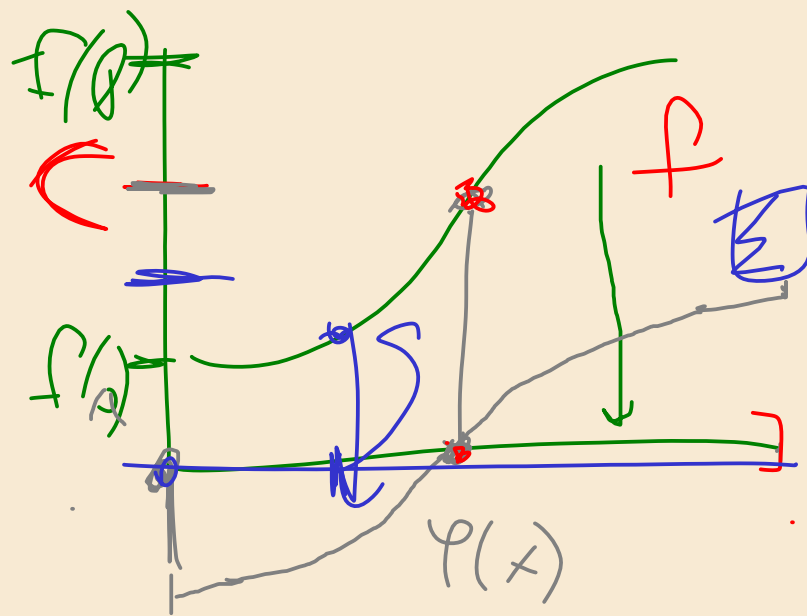
$$K.3 \quad \Pi$$

$$f(a) \neq f(b)$$

$$f(a) \neq f(b)$$

$$f(x) = 0$$





$$f(a) < C < f(b)$$

$$\varphi(x) = f(x) - C$$

$$\varphi(x)$$

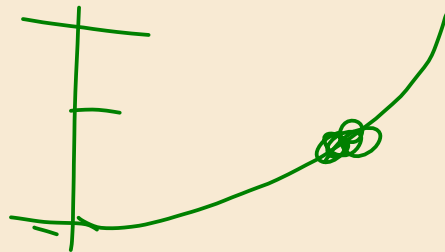
$$f(x) = \varphi(x) + C$$

$$x^3 + x - 1 = 0$$

$$[0, 1]$$

$$f(0) = 0 + 0 - 1 = -1$$

$$f(1) = 1 + 1 - 1 = 1$$



$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$$

$$f(x) \rightarrow 1$$

$$g(x) \rightarrow 5$$

$$\frac{0}{0} \quad \frac{\infty}{\infty}$$

$$\frac{\infty}{0} \rightarrow \infty$$

$$\frac{0}{\infty} \rightarrow 0$$

$$x \rightarrow \infty \quad \frac{1}{x^2} \rightarrow 0$$

$$\frac{x^2}{x} \rightarrow \infty$$

$$x \rightarrow \infty \quad \frac{x^2}{x} = x \rightarrow \infty$$

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$$

$$\frac{x}{x^2} \rightarrow \infty$$

$$\frac{x^2 - 4}{x - 2} \xrightarrow{\text{O/O}} \xrightarrow{x \rightarrow 2}$$

$$\frac{(x-2)(x+2)}{(x-2)} \quad x \neq 2$$

$$\frac{2x}{x+2} \xrightarrow{x \rightarrow 2} \quad \text{L.H.S.} = 1$$

$$\lim_{x \rightarrow \infty} \frac{3x+1}{2x-5} \rightarrow \infty$$

$$x \rightarrow \infty \quad 2x-5 \rightarrow \infty$$

$$\frac{3}{2} = 1.5$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$$

$$\frac{0}{0}$$

$$\frac{0}{0} \rightarrow \frac{0}{0}$$

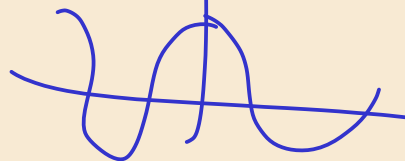
$x=0$
↗

~~x^2~~

$$x^2 \xrightarrow{x \rightarrow 0} 0$$

$$1 - \cos x \xrightarrow{x \rightarrow 0} 0$$

$$1 - \cos 0 = 1 - 1 = 0$$



$$\lim_{x \rightarrow 0} (1+x)^x$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{2x} \quad \frac{0}{0}$$

$$2x$$



$$\frac{\cos x}{2} \xrightarrow{x \rightarrow 0} \frac{1}{2}$$

$$\lim_{x \rightarrow 0} \frac{\ln(1+x)}{\frac{1}{1+x}} \rightarrow \frac{0}{0} \quad \text{L'Hôpital's Rule} \quad \text{f'(x)} / \text{g'(x)}$$

~~✗~~ ✓

$$\ln(1+0) = \ln(1)$$

$$e = 1$$

$$\frac{d}{dx} \ln(x+1) = \frac{1}{x+1}$$

~~$\frac{d}{dx} \ln(x) = \frac{1}{x}$~~

$f(x) = x$

$\frac{d}{dx} \ln(x+1) = \frac{1}{x+1}$