

$$f'(x) = \lim_{h \rightarrow 0} \frac{f\left(x\left(1+\frac{h}{x}\right)\right) - f(x)}{\frac{h}{x}} \quad x \neq 0$$

①

$$= \lim_{\substack{h \rightarrow 0 \\ x+h}} \frac{f(x)f\left(1+\frac{h}{x}\right) + 2 - 2f(x) - f\left(1+\frac{h}{x}\right)}{\frac{h}{x}}$$

②

$p \sin x = 1, 2, 3, \dots, p-1, p$

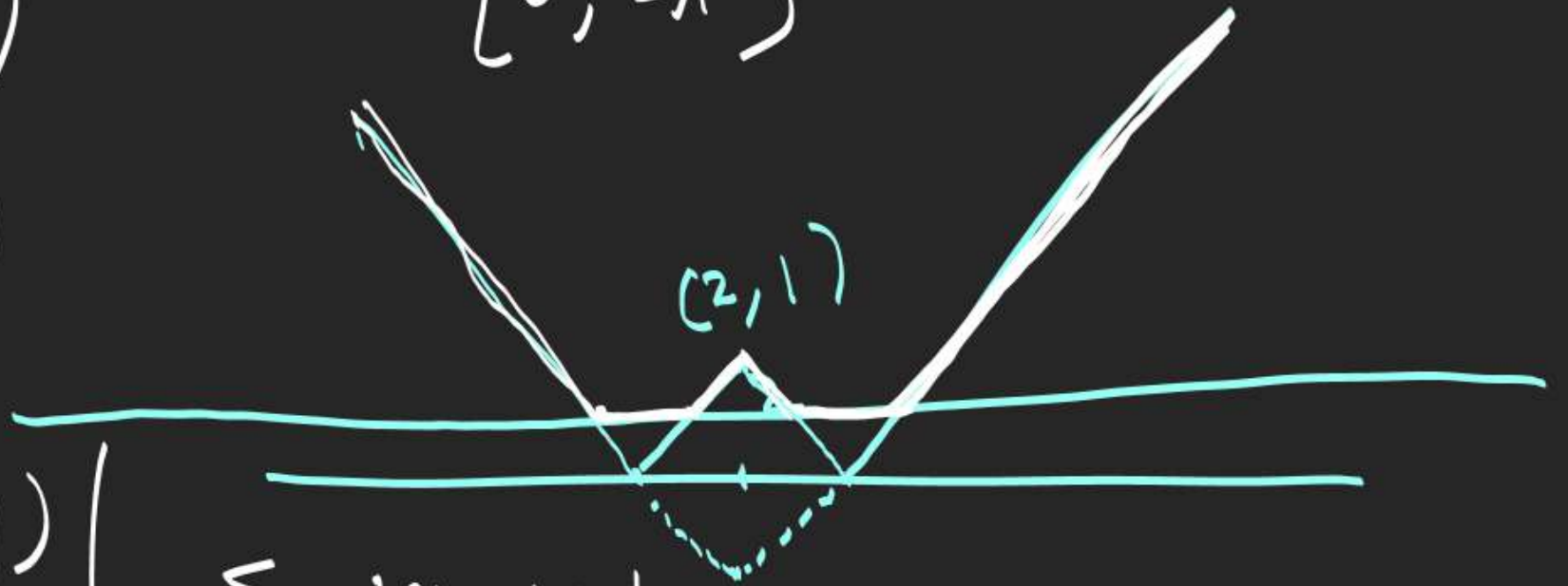
$$\max(\sin x, \cos x, \frac{1}{2})$$

$$[0, 2\pi]$$

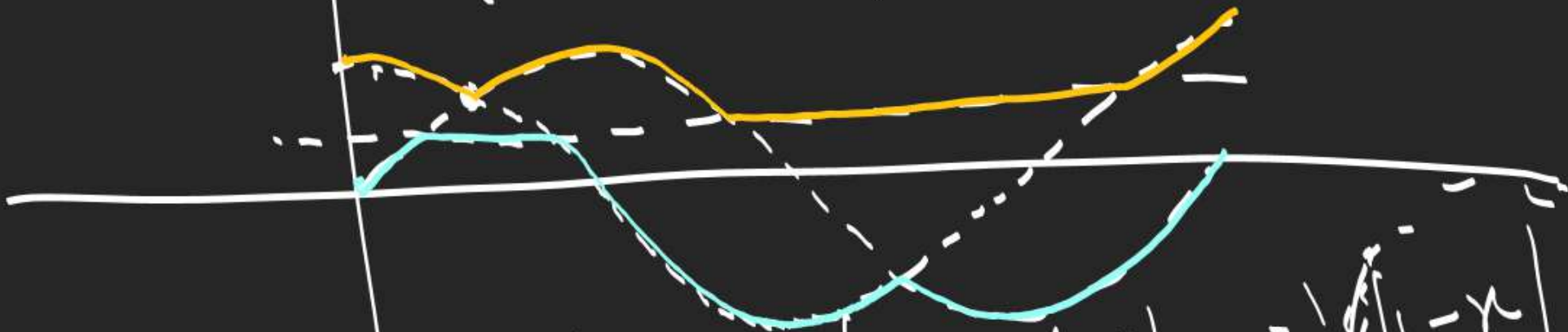
$$\min(\text{---})$$

$$x \neq y$$

$$\left| \frac{f(x) - f(y)}{x - y} \right| \leq |x - y|$$



$$x \neq 0 \checkmark$$

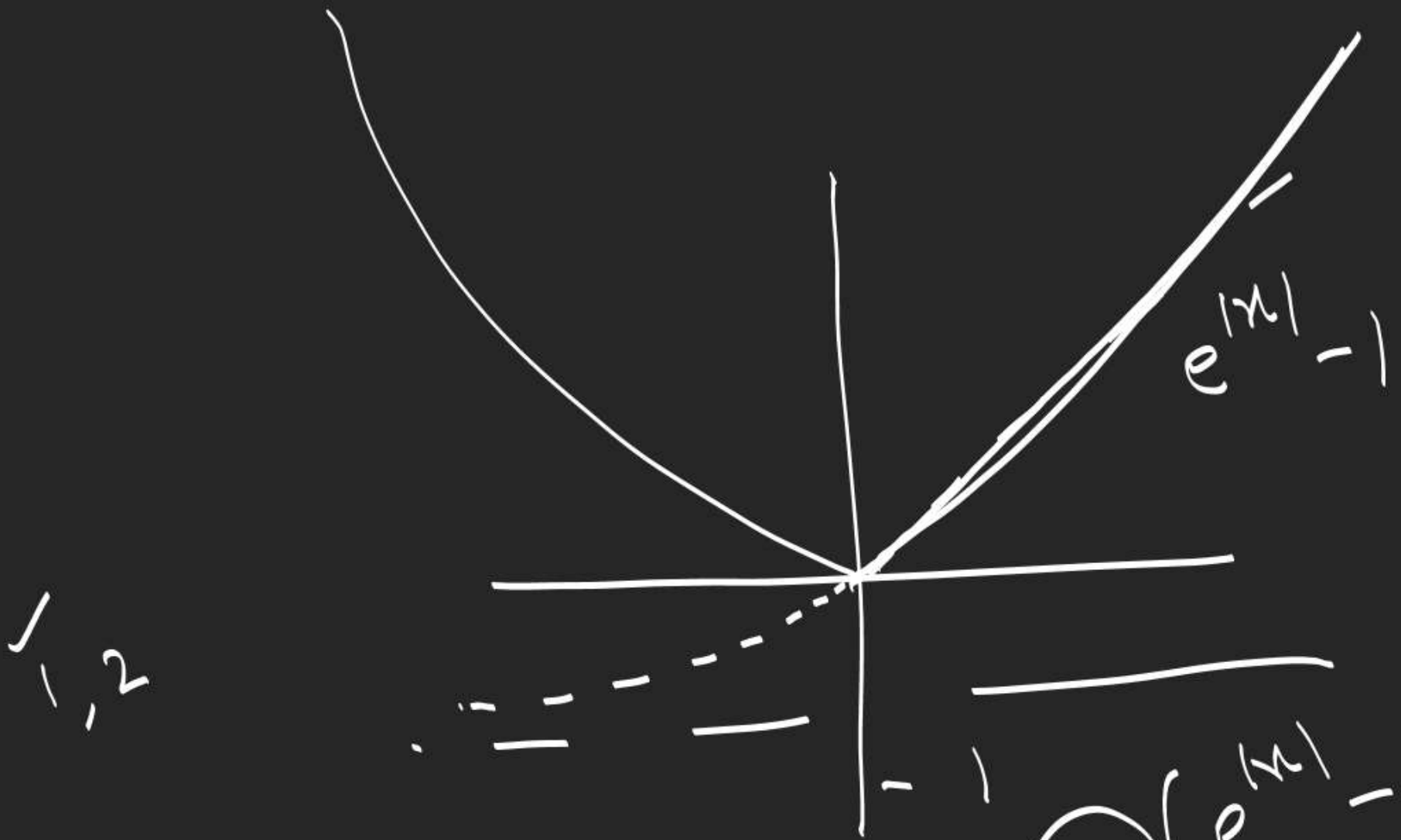


$$\lim_{x \rightarrow y} \left| \frac{f(x) - f(y)}{x - y} \right| \leq \lim_{x \rightarrow y} |x - y| \sin^{-1}(|x - y|)$$

$$\lim_{x \rightarrow y} |x - y| \sin^{-1}(|x - y|) = 0$$

$$\lim_{x \rightarrow y} \frac{\sin^{-1}(|x - y|) |x - y|}{|x - y|} = \frac{\sin^{-1}(|x - y|) |x - y|}{|x - y|}$$

$$x = 1$$



$$(x-1)(x+1)(x-1)(x-2) \cos x = 0 \Rightarrow 0, \pi, 2\pi$$

$x \rightarrow 1$

$$\frac{(x-1)(x+1)(x-1)(x-2) \cos x}{x-2}$$

$$(x-\pi)(e^{|x|}-1) \sin |x| = 0$$

$x \rightarrow 0$

$$(x-\pi)(e^{|x|}-1) \sin |x|$$

$$\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$$

$$\sin^{-1} x = \theta \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right], \sin^{-1} y = \phi \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$$

$$\frac{\theta + \phi}{2} \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$$

$$\cos \theta + \cos \phi = a(\sin \theta - \sin \phi)$$

$$2 \cos \frac{\theta + \phi}{2} \cos \frac{\theta - \phi}{2} = 2a \sin \frac{\theta - \phi}{2} \cos \frac{\theta + \phi}{2}$$

$$\cos \frac{\theta + \phi}{2} = 0 \quad \text{or} \quad \cot \frac{\theta - \phi}{2} = a$$

$$\cot^{-1} \cot \frac{\theta - \phi}{2} = \cot^{-1} a \quad \frac{1}{\sqrt{1-x^2}} - \frac{1}{\sqrt{1-y^2}} \frac{dy}{dx} = 0$$

$$\frac{\theta - \phi}{2} + n\pi = \cot^{-1} a$$

$$\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$$

$$1-18 \text{ (Ex-5)}$$

$$\sin^{-1} x - \sin^{-1} y = \text{const}$$

$$\frac{\theta + \phi}{2} = -\frac{\pi}{2}, \frac{\pi}{2} \quad \checkmark$$

$$\sin^{-1} x + \sin^{-1} y = -\frac{\pi}{2}, \frac{\pi}{2}$$

$$(x, y) = (-1, -1), (1, 1)$$