norms

vectors $\vec{x} = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \in \mathbb{R}^n$

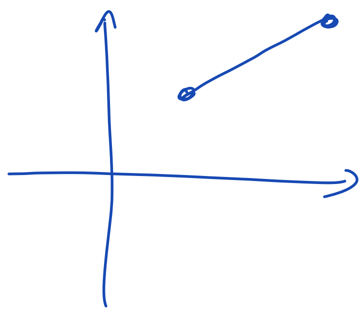
a vector space

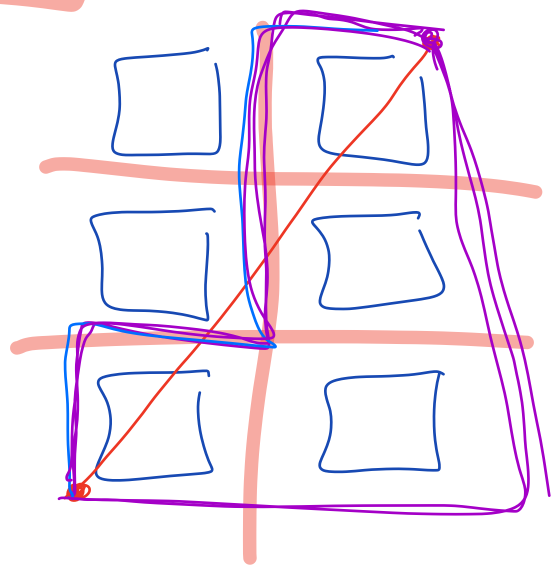
① L_1 norm $\|\vec{x}\| = \sum_{i=1}^{n} |x_i|$

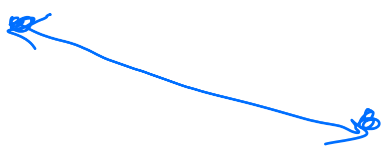
L_2 norm $\|\vec{x}\| = \sum_{i=1}^{n} x_i^2$ → distance

L_∞ norm $\|\vec{x}\| = \max_{i=1,\dots,n} \{|x_i|\}$

taxical norm







$\vec{x} = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}$ $\vec{y} = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}$

$\boxed{\|\vec{x} - \vec{y}\|_p}$

$y = \log_b(x)$

$x > 0$

$b > 0 \quad \boxed{b \neq 1}$

$f(x) = 1^x = 1$

$\log_{\sin(x)}\left(\frac{x+1}{x^2-5}\right)$

$\sin(x) > 0$

$\sin(x) \neq 1$

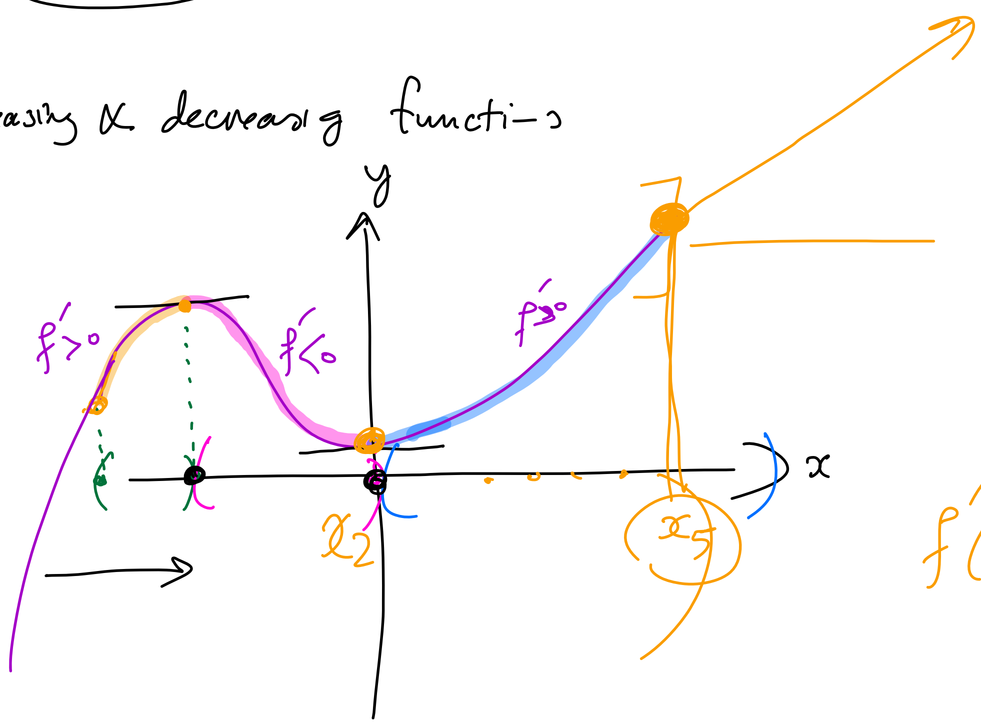
$\frac{x+1}{x^2-5} > 0$

sign table

$f(x) = \tan(x)$

$= \frac{\sin(x)}{\cos(x)}$

increasing & decreasing functions



$f'(x) \begin{cases} >0 \\ <0 \\ =0 \end{cases}$

$f(x)$

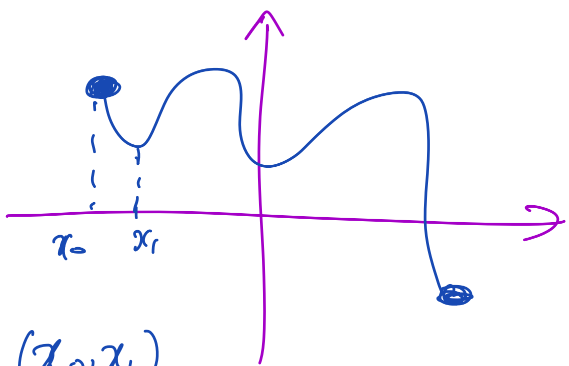
$\left.\begin{array}{l} f'(x) = 0 \\ f'(x) \text{ does not exist} \end{array}\right\} \rightarrow$ critical point

sign table $f'(x)$

	$-\infty$		x_0		x_1		x_2		$+\infty$
$f'(x)$		+		−		+		+	

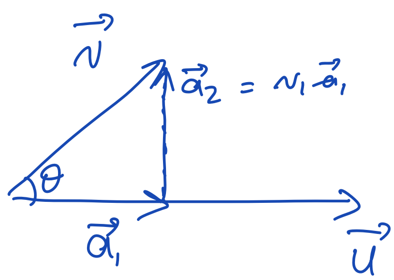
$(-\infty, x_0) \nearrow$

$(x_0, x_1) \searrow$



(x_0, x_1)

L_2 norm$(\vec{x})$ $p=2$



$$\rightarrow \boxed{\|\vec{v}_1 - \vec{a}_1\|^2 = \|\vec{v}\|^2 + \|\vec{a}_1\|^2 - 2\|\vec{v}\|\|\vec{a}_1\| \cos\theta}$$

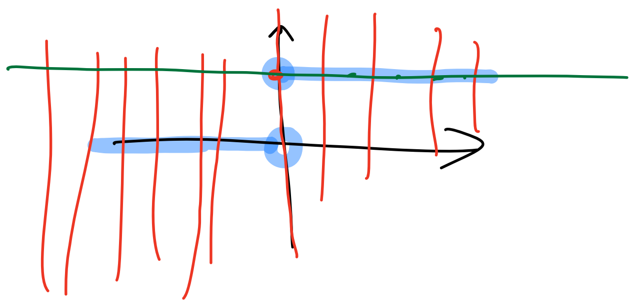
$\cancel{20}$ $\sqrt{\sum_{i=1}^{n} v_i^2}$

$$\boxed{\log_{\left(\frac{(x-1)^2}{x-1}\right)}\left(\frac{x-1}{x+2}\right)}$$

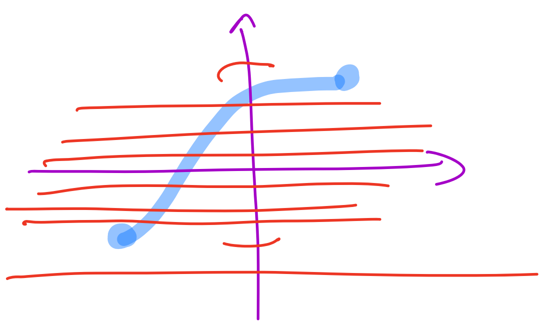
$$\log_{x-1}\frac{x-1}{x+2}$$

$x \neq 1$

$$f(x) = \begin{cases} 0 & x < 0 \\ 1 & x \geq 0 \end{cases}$$



1-to-1



$\sqrt{-\text{value}}$ ✗

value > 0

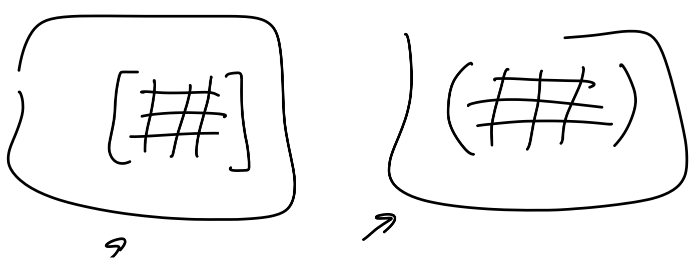
$\sqrt[2n]{}$ $\sqrt[2n+1]{}$

$\sqrt[8]{x}$

$x \geq 0$

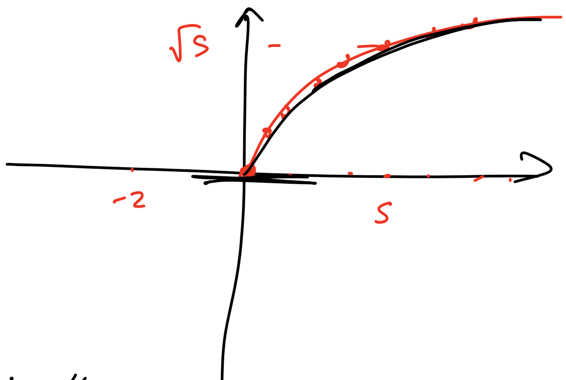
$\sqrt[3]{x}$ $x \in \mathbb{R}$

matrix



$\boxed{\text{lin. alg}}$

$y = \sqrt{x}$



$\boxed{\sqrt{4} = 2}$ 4=4

$-\sqrt{4} = -2$ 4=4

$(2)^2 = (-2)^2 = 4$

$\sqrt{9}$

$\cancel{\sqrt{4} = \pm 2}$

Schaum's Outline of Linear Algebra

1, 2, 3, 4
7 9