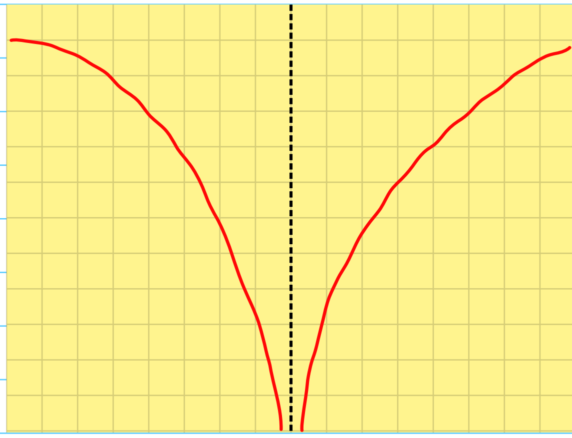
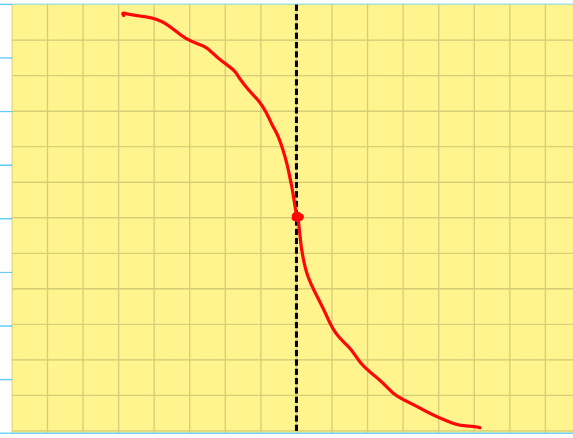




$$f(x) = \sqrt[3]{x} - x$$

$$f'(x) = \frac{1}{3}x^{-\frac{2}{3}} - 1$$

$$= \frac{1}{3\sqrt[3]{x^2}} - 1$$

plug test values in

$f'(x) = 0$ to find maximum

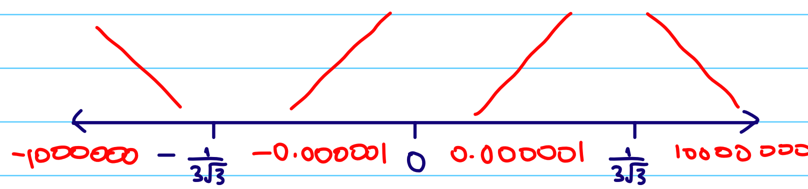
$$0 = \frac{1}{3\sqrt[3]{x^2}} - 1$$

$$1 = \frac{1}{3\sqrt[3]{x^2}}$$

$$\sqrt[3]{x^2} = \frac{1}{3}$$

$$x^2 = \frac{1}{27}$$

$$x = \pm\frac{1}{3\sqrt{3}}$$

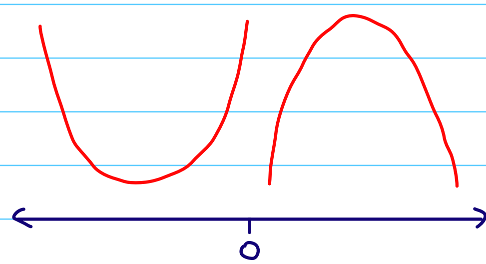


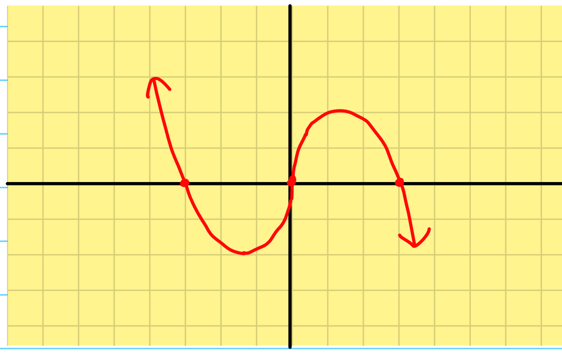
on number line
put first derivative
and any restriction

$$f''(x) = -\frac{2}{9}x^{-\frac{5}{3}}$$

$$= -\frac{2}{9\sqrt[3]{x^5}}$$

$$= -\frac{2}{9x\sqrt[3]{x^2}}$$





$y = \frac{x^3-1}{x+1}$

find x-int

$0 = \frac{x^3-1}{x+1}$

$x = 1$

find y-int

$y = \frac{0-1}{0+1}$

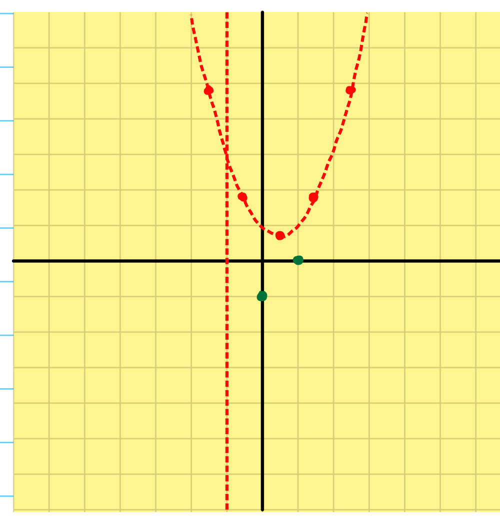
$y = -1$

simplify

$y = \frac{x^3-1}{x+1}$

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

$y = (x-\frac{1}{2})^2+\frac{3}{4}-\frac{2}{x+1}$



$y = x^5 - 3x^2 - 2x - 1$

$y' = 5x^4 - 6x - 2$

$f(>2)$ ⊕

$f(2)$ ⊕

$\updownarrow$ only x-int

$f(1)$ ⊖

$f(0) = -1$

$f(-\frac{1}{2}) = $ ⊖

$f(-1) = -3$

$$\boxed{\begin{array}{l} x = Ans - \frac{f(x)}{f'(x)} \\ \text{first Ans (seed value)} \\ \text{keep hitting } \boxed{=} \end{array}}$$

$$x = Ans - \frac{(Ans^5 - 3Ans^2 - 2Ans - 1)}{(5Ans^4 - 6Ans - 2)}$$

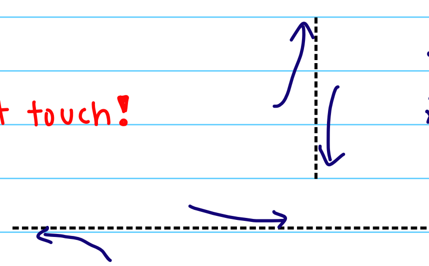
x-int: 1.659302068

Jan 25 $f(x) = \frac{x^2-1}{x^3}$

1. Domain $\{x \in \mathbb{R} \mid x \neq 0\}$

2. Symmetry $f(-x) = -f(x)$ ∴ odd

3. Asymptote VA @ $x = 0$ → cannot touch!

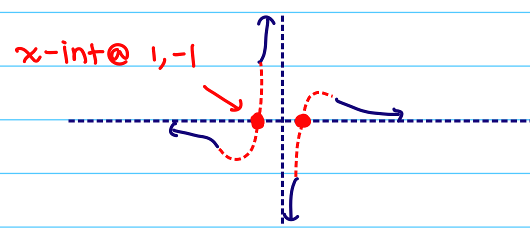


$\lim_{x \to 0^+} = $ ⊖

$\lim_{x \to 0^-} = $ ⊕

HA $\lim_{x \to \infty} \frac{x^2-1}{x^3} = 0$

$y = 0$



$$f'(x) = \frac{(2x)(x^3) - (x^2-1)(3x^2)}{(x^3)^2}$$

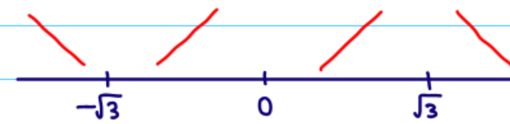
$$= \frac{2x^2 - 3(x^2-1)}{x^4}$$

$$= \frac{3-x^2}{x^4}$$

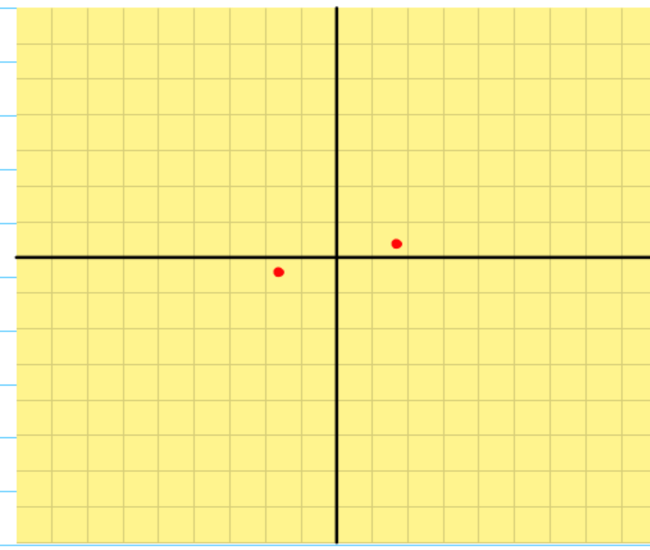
find max-min:

$f'(x)=0$

$x=\pm\sqrt{3}$

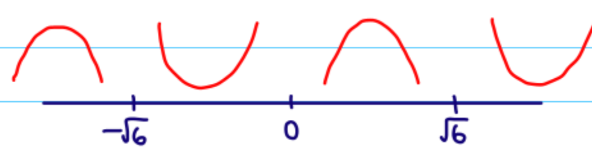


$f(\sqrt{3})=\frac{2}{3\sqrt{3}}=\frac{2\sqrt{3}}{9}$



$$f''(x)=\frac{-2x(x^4)-(3-x^2)4x^3}{x^8}$$

$$=\frac{2x^2-12}{x^5}$$



[redacted]

$f(x) = x\sqrt{1-x^2}$

① Domain $\quad 1-x^2 \geq 0$

$x^2 \leq 1$

$x \leq 1, \quad x \geq -1$

$-1 \leq x \leq 1$

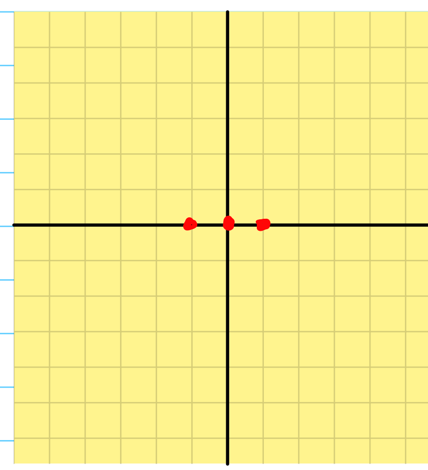
② Symmetry $\quad f(-x) = (-x)\sqrt{1-(-x)^2}$

$= -x\sqrt{1-x^2}$

$= -f(x) \quad \therefore$ odd

③ Asymptotes $\quad$ no VA

no HA



x-int: $\quad 0 = x\sqrt{1-x^2}$

$x = 0 \qquad \sqrt{1-x^2} = 0$

$x = 1, -1$

y-int: $\quad y = 0$

$f'(x) = (1)(\sqrt{1-x^2}) + (x)\left(\frac{-2x}{2\sqrt{1-x^2}}\right)$

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

$0 = \sqrt{1-x^2} - \frac{x^2}{\sqrt{1-x^2}}$

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

$x^2 = 1-x^2$

$2x^2 = 1$

$x = \pm\frac{1}{4}$