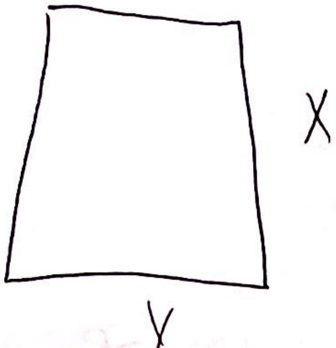
1)




$A = xy = 1000$

$P(x) = 2x + 2y$

$y = 1000/x$

$2x + 2\left(\frac{1000}{x}\right)$

$P' = \frac{d}{dx}\left(2x + \frac{2000}{x}\right)$

$\frac{d}{dx}(2x) + \frac{d}{dx}\left(\frac{2000}{x}\right)$

$2(1) = 2000\left(\frac{-1}{x^2}\right) \rightarrow 2 - \frac{2000}{x^2}$

So at critical point $P' = 0$

$2 - \frac{2000}{x^2} = 0$

$2000 = 2x^2 = x^2 = 1000$

$x = \sqrt{1000} = 10\sqrt{10}$

Then we do

$P'' = \frac{d}{dx}\left(2 - \frac{2000}{x^2}\right) = 0 - \frac{2000(-2)}{x^3}$

$= \frac{4000}{x^3}$

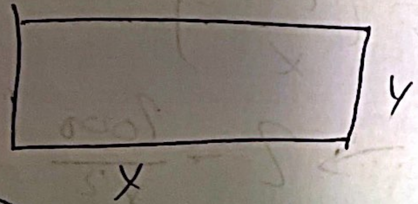
$x = 10\sqrt{10}$ ↓ sub in → , $P'' = \frac{4000}{10\sqrt{10}}$

Since $p''$ = double derivative of p is (+ve) at $x = 10\sqrt{10}$ p = minimum or $10\sqrt{10}$

when $x = 10\sqrt{10}$

$y = \frac{1000}{10\sqrt{10}} = 10\sqrt{10}$

$\left(\frac{x}{10\sqrt{10}}, \frac{y}{10\sqrt{10}}\right)$




Derivative for critical points

2) $y = \frac{1}{x^2-9}$ graph

$\frac{d}{dx}\left(\frac{1}{x^2-9}\right)$ → exp rule $\frac{d}{dx}\left((x^2-9)^{-1}\right)$

↓

chain $\frac{d}{du}(u^{-1})\frac{d}{dx}\left((x^2-9)\right)$

$\frac{d}{du}(u^{-1})$ = power rule → $-1 \cdot u^{-1-1}$ →

2 (Cont.)

$-1 \cdot u^{-1-1}$

$-1 \cdot u^{-2} \rightarrow \text{exp rule} \rightarrow -1 \cdot \frac{1}{u^2} \nearrow -\frac{1}{u^2} = -\frac{1}{u^2}$

$-\frac{1}{u^2} \frac{d}{dx}((x^2-9))$

$-\frac{1}{(x^2-9)^2} \frac{d}{dx}(x^2-9) \rightarrow \frac{d}{dx}(x^2-9)$ sum/Diff $\frac{d}{dx}(x^2) - \frac{d}{dx}(9)$

subst

$\frac{d}{dx}(x^2)$ Power $\rightarrow$ [illegible] $2x^{2-1} = 2x$

$\frac{d}{dx}(9) \rightarrow = 0$ Constant $= 2x - 0$

$\frac{1}{x^2-9} \cdot \frac{2x}{1}$

$\frac{1 \cdot 2x}{(x^2-9)^2} = \frac{2x}{(x^2-9)^2}$ now graph

1) $y = \frac{1}{x^2-9}$

domain $x^2-9=0$ $x=3, x=-3$

domain $= x < -3$ or $-3 < x < 3$

range $\frac{1}{x^2-9} = y \rightarrow \frac{1}{x^2-9}(x^2-9) = y(x^2-9)$

$$\frac{1}{x^2-9}(x^2-9) = y(x^2-9)$$

$$\frac{1 \cdot \cancel{(x^2-9)}}{\cancel{x^2-9}} \quad 1 = y(x^2-9)$$

$y(x^2-9)$ distributive

use Quadratic eq $\rightarrow$

$yx^2 \cdot y \cdot 9 = x^2y - y \cdot 9 \rightarrow x^2y \cdot 9y -$

$yx^2 - 9y - 1 = 0 \rightarrow = 0^2 - 4y(-9y-1)$

$a = y$ $b = 0$

$c = -9y - 1$

$0^2 - 4y(-9y-1) \rightarrow 0^2 = 0$

$0 - 4y(9y - 1)$

$-4y(9y-1)$ distribute

$-4(9y) - (-4y) \cdot 1 = 36y^2 +$

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2 (cont)

$$\frac{36y^2+4y}{4} \geq \frac{0}{4}$$

$9y^2+y \geq 0$

$9y^2+y = 9yy+y = y(9y+1)$

$y(9y+1) \geq 0$

interval of y

$y=0$, $y<0$
$y>0$

$9y+1 \rightarrow$ $9y+1-1 = 0-1$

$\frac{9y=-1}{9}$ $y = \frac{-1}{9}$

$y < -\frac{1}{9}$, $y > \frac{-1}{9}$

so, $y > -\frac{1}{9}$, $y < -\frac{1}{9}$, $y=0$, $y \geq 0$

$y \leq \frac{-1}{9}$ or $y \geq 0$ see if it wrs

$\frac{1}{x^2-9} = -\frac{1}{9}$ cross fator multiply

$1 \cdot 9 = -(x^2-9) \cdot 1$

$9 = -(x^2-9)$

2 (cont II)

$$\frac{9 = -(x^2-9)}{-1}$$

$-9 = x^2-9$

$x^2 = 0$

$x = 0$

$\Rightarrow x^2-9=0$

$+9 \quad +9$

$x^2 = \sqrt{9}$

$x=3, x=-3$

works, so $y = \frac{-1}{9}$ is in range

$y=0 \quad \frac{1}{x^2-9} = 0$

no sol for $1=0$

so

range

$= f(x) \leq -\frac{1}{9}$ or $f(x) > 0$

no x axis intercep points

$$\frac{1}{0^2-9} = \frac{1}{0-9} = y = \frac{1}{-9}$$

fraction rule

$y = -\frac{1}{9}$

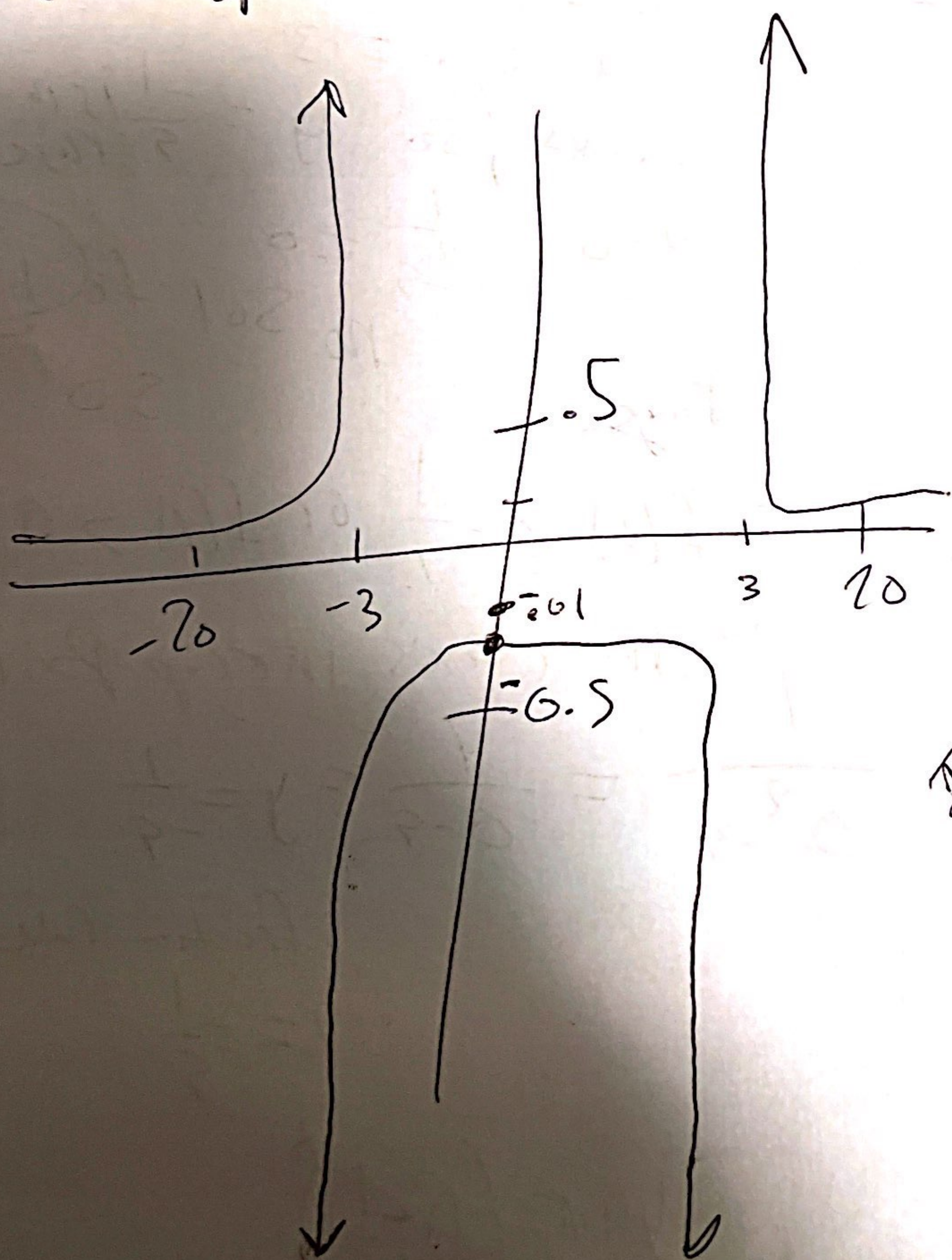
$y \text{ int} = \left(0, -\frac{1}{9}\right)$

2 graph

intercept = y = $\left(0, -\frac{1}{9}\right)$

asymptotes =

$x = -3$, $x = 3$ $y = 0$




I think this is right. this was a Lot of work.

3)

$f(x) = x\sqrt{4-x^2}$, $[-1, 2]$

domain $x\sqrt{4-x^2} = 4-x^2 \geq 0$

$-x^2 \geq -4 \Rightarrow (-x^2)(-1) \leq (-4)(-1)$

Simplify

$x^2 \leq 4 \Rightarrow -\sqrt{4} \leq x \leq \sqrt{4}$

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

$-2 \leq x \leq 2$

~~Range~~ $\cancel{x\sqrt{4-x^2}}$

Derivative $= \frac{d}{dx}\left(x\sqrt{4-x^2}\right)$

Product

$\frac{d}{dx}\sqrt{4-x^2} + \frac{d}{dx}\left(\sqrt{4-x^2}\right)x$

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

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$\frac{d}{dx}(4-x^2)$

Chain rule

$\frac{d}{du}(\sqrt{u})\frac{d}{dx}(4-x^2)$

$\frac{d}{du}(\sqrt{u})$ radical rule $\rightarrow \frac{1}{2}u^{\frac{1}{2}-1}$

$\frac{d}{du}(u^{\frac{1}{2}})$ power rule $\quad u^{\frac{1}{2}-1} = \frac{1}{2}-1$

$= -\frac{1}{2} = \leftarrow \frac{1\cdot 2}{2}+\frac{1}{2}$

fraction rule $\quad$ exponent rule

$u^{-\frac{1}{2}} = \frac{1}{2}u^{-\frac{1}{2}} \rightarrow \frac{1}{2}\cdot\frac{1}{\sqrt{u}} = \frac{1}{2\sqrt{u}}$

$\frac{1}{2\sqrt{4-x^2}}\frac{d}{dx}(4-x^2) =$

$\frac{d}{dx}(4-x^2)$

sum Diff

$\frac{d}{dx}(4) - \frac{d}{dx}(x^2) \rightarrow \frac{d}{dx}(4) = 0$

$\frac{d}{dx}(x^2) = 2x^{2-1} \rightarrow 2x = 0-2x \rightarrow -2x$

~~9/6~~

3 (cont

$2x$

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

$$\frac{1 \cdot 2x}{2\sqrt{4-x^2}}$$

$$\frac{1 \cdot x}{\sqrt{4-x^2}} \to \frac{-x}{\sqrt{-x^2+4}}$$

$$= -\frac{x}{\sqrt{4-x^2}} + \left(\frac{-x}{\sqrt{4-x^2}}\right)x$$

$$1 \cdot \sqrt{4-x^2} + \left(\frac{-x}{\sqrt{4-x^2}}\right)x$$

$$1 \cdot \sqrt{4-x^2} = \sqrt{4-x^2}$$

$$\frac{x}{\sqrt{4-2x^2}}x = \frac{xx}{\sqrt{4-2x}}$$

explue

$$x^{1+1} = x^2 \quad \frac{x^2}{\cancel{4-x^2}\ 4-x^2} = \sqrt{x^2+4} \quad \frac{-x^2}{\sqrt{-x^2+4}}$$

(c) 3 Fd

$$\frac{-x^2}{\sqrt{4-x^2}} + \frac{\sqrt{4-x^2}\sqrt{4-x^2}}{\sqrt{4-x^2}}$$

$$x^2 + \sqrt{4-x^2}\sqrt{4-x^2}$$

$$-x^2 + 4 - x^2$$

$$=$$

$$-2x^2 + 4 = \frac{-2x^2+4}{\sqrt{4-x^2}}$$

Derive

now the absolute.

Critical Points

$f'(n) = 0$

$$\frac{2(2 - x^n)}{4 - x^n} = 0 = x \pm \sqrt{2}$$

$x \neq \sqrt{-2}$ becaus not in $[-1, 2]$

8 final page

$x = \sqrt{2}$ works

at $x = \sqrt{2}$ $f(\sqrt{2}) = \sqrt{2}\sqrt{4-(\sqrt{2})^2} = 2$

at $x = -1$ $f(-1) = -1\sqrt{4-(-1)^2} = -$

$f(-1) = -\sqrt{3}$

at $x = 2$ $f(2) = 2\sqrt{4-(2)^2} = 0$

$f(2) = 0$

absolut max of $f(x)$ is 2 at $x =$

absolut min $f(x)$ is $-\sqrt{3}$ at $x$

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4) $f'(t) = 4T^3 + 3T^2 + 2T = 0$

$T(4T^2 + 3T + 2) = 0$

$T = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

~~Qu~~ Quadratic

$T = \dfrac{-3 \pm \sqrt{9 - 4 \cdot 4 \cdot 2}}{2 \cdot 4}$

$\dfrac{3 \pm \sqrt{-23}}{8}$

$\boxed{T = 0, \ \dfrac{3 + \sqrt{-23}}{8}, \ \dfrac{3 - \sqrt{-23}}{8}}$

[illegible]

answer

I think

I did change Derivative of this but it only give 0 so I tri