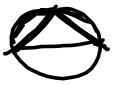
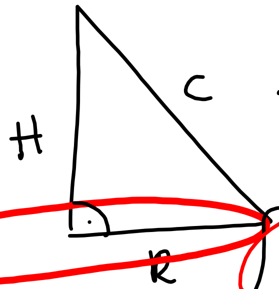
$V_o = \frac{1}{3} P_p \cdot H$

D: $c > 0$



$V_s = \frac{1}{3} \pi R^2 \cdot H \leftarrow MAX$



$R^2 + H^2 = c^2$

$R^2 = c^2 - H^2$

$\boxed{H \in (0, c)}$

$V(R, H) = \frac{1}{3} \pi R^2 \cdot H$

I $H < R$

$$V(H) = \frac{1}{3}\pi (c^2 - H^2) \cdot H = -\frac{1}{3}\pi H^3 + \frac{1}{3}\pi c^2 H$$

$H < c - R < c - 0 = c$

$R > 0$

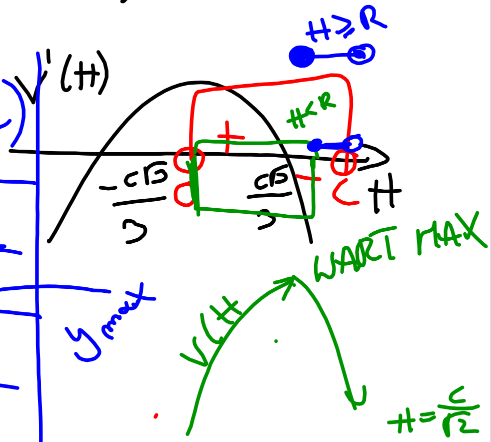
$-R < 0$

$$V'(H) = -\pi H^2 + \frac{1}{3}\pi c^2 = -\pi\left(H^2 - \frac{1}{3}c^2\right) = -\pi\left(H - \frac{c\sqrt{3}}{3}\right)\left(H + \frac{c\sqrt{3}}{3}\right)$$

H	$\left(0, \frac{\sqrt{3}c}{3}\right)$	$\frac{\sqrt{3}c}{3}$	$\left(\frac{\sqrt{3}c}{3}, \cancel{c}\right)$ $\frac{c\sqrt{2}}{2}$	$\left\langle \frac{c\sqrt{2}}{2}, c\right)$
$V'(H)$	+	0	—	—
$V(H)$	↗	y_{max}	↘	↘

y_{max}

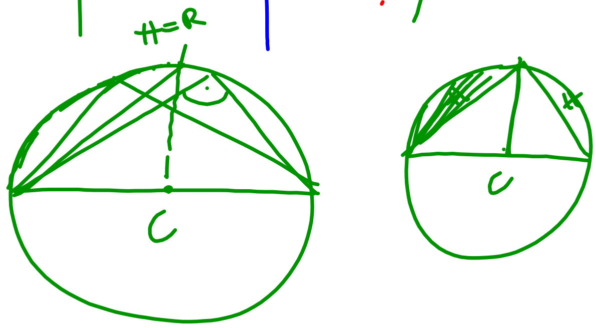
$H \geq R$



$H < R$

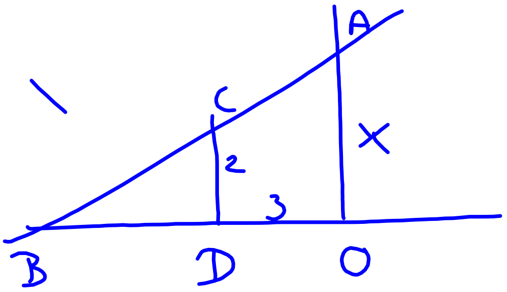
$H \in \left(0, \frac{c}{\sqrt{2}}\right)$

$\left(0, \frac{c\sqrt{2}}{2}\right)$



$\underset{M}{\frac{c}{\sqrt{2}}} > \underset{U}{\frac{c}{\sqrt{3}}}$

$H \geq R \Rightarrow V_{max}$ dla $H = R = \frac{c\sqrt{2}}{2}$



$L(x)$

$D_L: x \in (2, +\infty)$

$$L(x) = \sqrt{x^2 + \frac{9x^2}{(x-2)^2}} \qquad y = \sqrt{x} \nearrow$$

$$f'(x) = \left(x^2 + \frac{9x^2}{(x-2)^2}\right)' = 2x +$$

$$\left(\left(\frac{3x}{x-2}\right)^2\right)' = 2 \cdot \frac{3x}{x-2} \cdot \left(\frac{3x}{x-2}\right)' =$$

$$= 2 \cdot \frac{3x}{x-2} \cdot \frac{3 \cdot (x-2) - 3x}{(x-2)^2} = \frac{6x \cdot (-6)}{(x-2)^3} = \frac{-36x}{(x-2)^3}$$

$$f'(x) = 2x + \frac{-36x}{(x-2)^3} = 2x\left(1 - \frac{18}{(x-2)^3}\right)$$

$$= \frac{2x\left((x-2)^3 - 18\right)}{(x-2)^3}$$

$$f'(x) = 0 \iff x = 0 \lor (x-2)^3 - 18 = 0$$

$$x - 2 = \sqrt[3]{18}$$

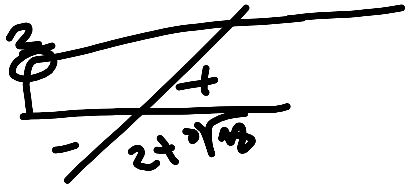
$$\boxed{x = \sqrt[3]{18} + 2}$$

$$\left(x\sqrt{1+\frac{9}{(x-2)^2}}\right)' = \sqrt{1+\frac{9}{(x-2)^2}} + x\cdot\frac{9\cdot\left(-\cancel{2}\cdot\frac{1}{(x-2)^3}\right)}{\cancel{2}\sqrt{1+\frac{9}{(x-2)^2}}} =$$

$$= \frac{1+\frac{9}{(x-2)^2} - \frac{9x}{(x-2)^3}}{\sqrt{\dots}} = \frac{\frac{(x-2)^3+9(x-2)-9x}{x-2}}{\sqrt{\dots}\,(x-2)^2} =$$

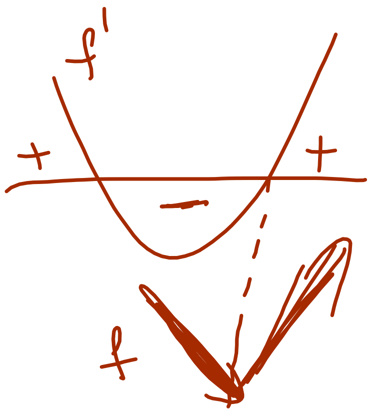
$$= \frac{(x-2)^3-18}{\underbrace{\sqrt{\dots}\,(x-2)^2(x-2)}_{>0,\text{ bo } D:\ x>2}}$$

$$(x-2)^3-18=0$$
$$x=\sqrt[3]{18}+2$$



x	$(2, \sqrt[3]{18}+2)$	x_0	$(x_0, +\infty)$
$L'(x)$	$-$	0	$+$
$L(x)$	↘	y_{min}	↗

$$\left(9\cdot(x-2)^{-2}\right)' = 9\cdot(-2\cdot(x-2)^{-2-1}\cdot(x-2)'$$



$$A=\{(x,y): \log_y(8x+y-2-x^2) \geqslant \log_y(8-x^2+8x-2y-y^2)\}$$

$$\begin{cases} y\in(0,+\infty)\setminus\{1\} \\ 8x-x^2-2+y>0 \quad \text{II} \\ 8x-x^2+8-2y-y^2>0 \quad \text{III} \\ (y\in(0,1) \wedge 8x+y-2-x^2 \leqslant 8-x^2+8x-2y-y^2) \quad \text{IV} \\ \vee \\ (y\in(1,+\infty) \wedge 8x+y-2-x^2 \geqslant 8-x^2+8x-2y-y^2) \quad \text{V} \end{cases}$$

II: $y>x^2-8x+2$

$y>(x-4)^2-14$

III: $x^2+y^2-8x+2y-8<0$

$(x-4)^2-16+(y+1)^2-1-8<0$

$(x-4)^2+(y+1)^2<5^2$

$S(4,-1);\ r=5$

IV: $y-2 \leqslant 8-2y-y^2$

$y^2+3y-10 \leqslant 0$

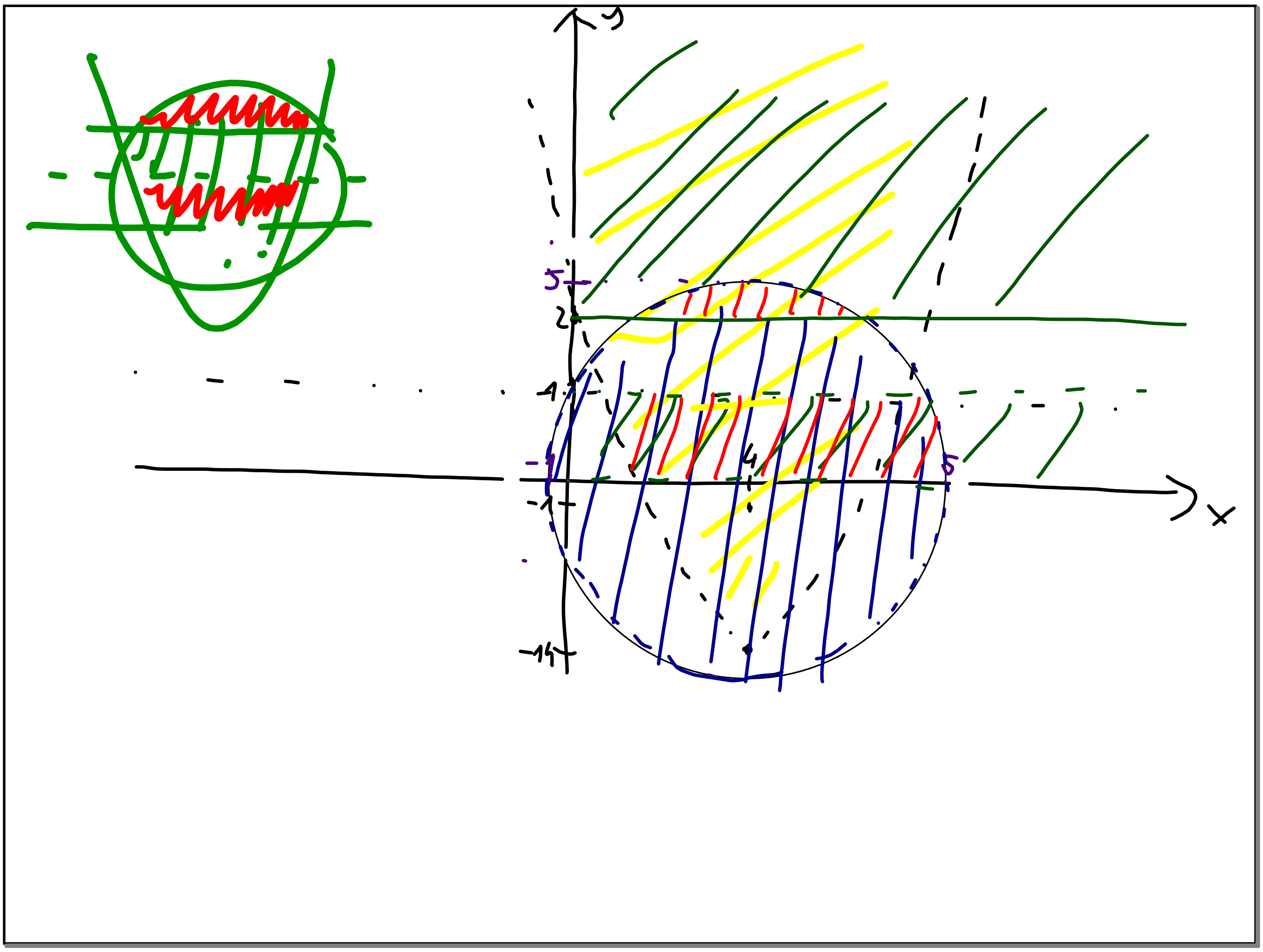
$(y+5)(y-2) \leqslant 0$

$\boxed{y\in\langle -5,2\rangle}$

$y\in(0,1)$

V: $(y+5)(y-2) \geqslant 0 \quad \wedge \quad y>1$

$y\in\langle 2,+\infty)$


y
x
5
2
1
-1
-1
4
-14