$$\left[x^2 \cdot \sin\left(\frac{1}{x}\right)\right]' = 2x \cdot \sin\left(\frac{1}{x}\right) +$$

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

$$\int \frac{1}{(w^2+1)^2}\,dw = \int \frac{1+w^2-w^2}{(\ldots)^2}\,dw =$$

$$= \int \frac{1}{(w^2+1)^1}\,dw - \int \frac{w^2}{(w^2+1)^2}\,dw =$$

$$\boxed{\operatorname{arctg} w}$$

$$\int \frac{w}{(w^2+1)^2} \cdot w \, dw = \left| \begin{array}{ll} u = w & u' = 1 \\ v' = \frac{w}{(\cdots)^2} & v = \frac{-1}{2\cdot(w^2+1)} \end{array} \right|$$

$$\int \frac{w}{(w^2+1)^2} \, dw = \left| \begin{array}{l} t = w^2+1 \\ dt = 2w \, dw \\ w \, dw = \frac{1}{2} dt \end{array} \right| = \frac{1}{2} \int t^{-2} \, dt =$$

$$= \frac{1}{2} \cdot \frac{t^{-1}}{-1} = \frac{-1}{2(w^2+1)}$$

$$= w \cdot \frac{-1}{2\cdot(w^2+1)} - \int \frac{-1}{2\cdot(w^2+1)}\,dw =$$

$$= \frac{-w}{2\cdot(w^2+1)} + \frac{1}{2}\,\operatorname{arctg} w + c_1$$

$$10^{-n-1} < 10^{-5} \cdot \ln 10 \qquad \Big|\ \ln(\cdot) \nearrow$$

$$\ln 10^{-n-1} < \ln\left(10^{-5} \cdot \ln 10\right)$$

$$\lim_{\bullet \to 0} \frac{e^{\bullet} - 1}{\bullet} = 1$$

$$\lim_{x \to 0} \frac{e^{x^2-3x} - 1}{x^2-3x}$$


x
x_0
a

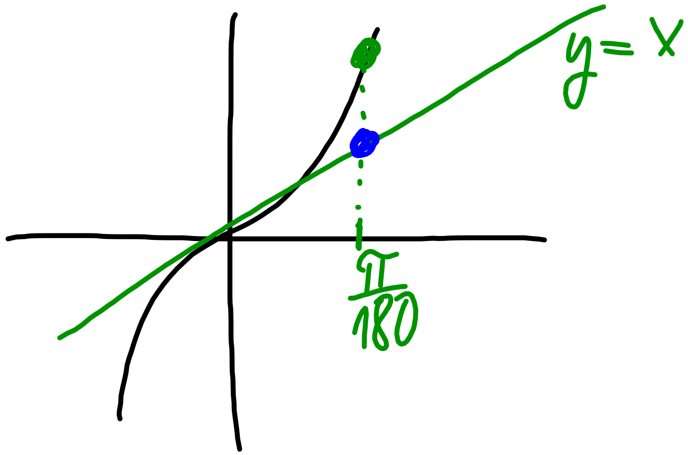
$$T(x) = \underbrace{f(x_0) + f'(x_0)\cdot(x - x_0)}_{t\,-?} \approx f(x)$$

$$\boxed{\operatorname{tg} 1^\circ = \operatorname{tg}\frac{\pi}{180} \qquad x_0 = 0}$$

$$f(x) = \operatorname{tg} x, \quad f'(x) = \frac{1}{\cos^2 x}$$

$$\operatorname{tg}\frac{\pi}{180} \approx \operatorname{tg} 0 + \frac{1}{\cos^2 0}\cdot\underbrace{\left(\frac{\pi}{180} - 0\right)} =$$

$$= 0 + 1\cdot\frac{\pi}{180} = \frac{\pi}{180}$$



$f(x)$, x_0 BL. $\tilde{x}$ | СМЕНЕ $f(\tilde{x}) \approx$

$\approx f(x_0) + f'(x_0) \cdot (\tilde{x} - x_0)$

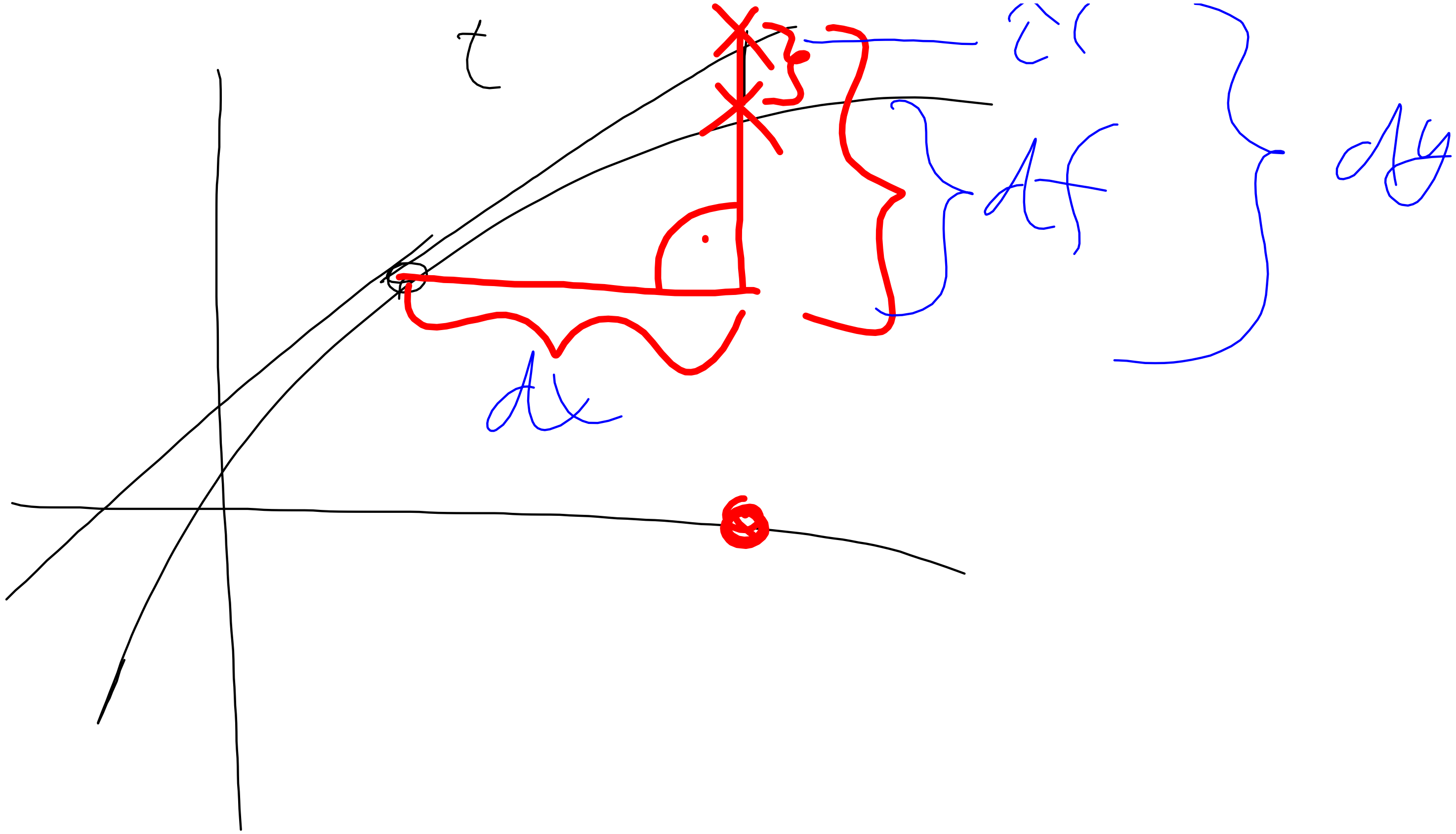
$t: \; y - y_0 = f'(x_0) \cdot (x - x_0)$

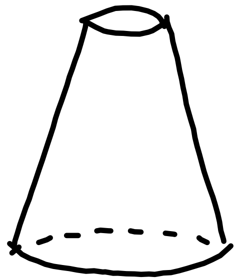
$y = f(x_0) + f'(x_0) \cdot (x - x_0)$

$\sqrt{10}$, $f(x)=\sqrt{x}$, $x_0=9$, $\tilde{x}=10$,

$f'(x)=\frac{1}{2\sqrt{x}}$, $f(9)=\sqrt{9}=3$, $f'(9)=\frac{1}{6}$

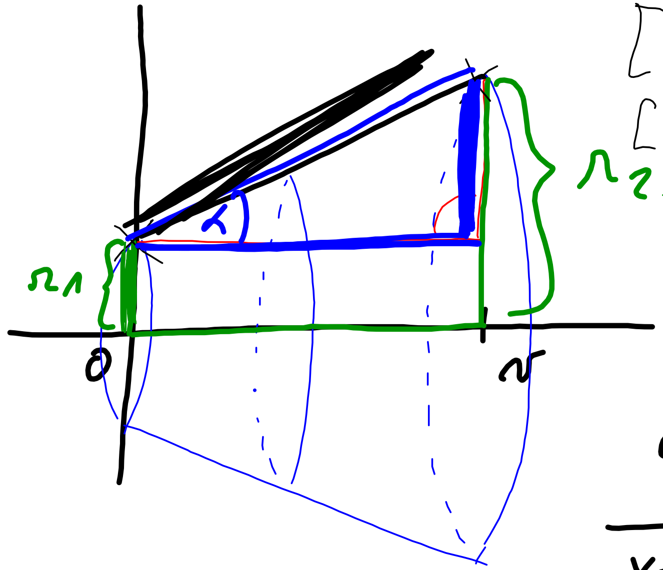
$t: y=3+\frac{1}{6}\cdot(x-9) \Rightarrow \sqrt{10}\approx 3+\frac{1}{6}\cdot(10-9)$


t
dx
df
dy



$V = ?$

$P = ?$



$[0, r_1]$

$[v, r_2]$

$x = 0 + t \cdot v$

$y = r_1 + t \cdot (r_2 - r_1)$

$y = ax + b$

$y = \frac{r_2 - r_1}{v} x + r_1$

$x = t \cdot v$

$y = r_1 + t(r_2 - r_1)$

$$\left.\begin{aligned} x \cdot (r_2 - r_1) &= \underbrace{t \cdot v \cdot (r_2 - r_1)} \\ y \cdot v &= r_1 \cdot v + \underbrace{t \cdot v \cdot (r_2 - r_1)} \end{aligned}\right\} - \Rightarrow yv - x \cdot (r_2 - r_1) = r_1 v$$

$$\Rightarrow \quad y = \frac{x \cdot (r_2 - r_1) + r_1 v}{v} = x \cdot \frac{r_2 - r_1}{v} + r_1$$

$$f(x) = \boxed{\frac{r_2 - r_1}{v}} \cdot x + r_1 \, , \quad x \in [0, v]$$

$$V = \pi \cdot \int_a^b f^2(x)\, dx = \pi \cdot \int_0^v \left(\frac{r_2 - r_1}{v} \cdot x + r_1 \right)^2 dx =$$

$$= \pi \cdot \int_0^v \left(\frac{r_2 - r_1}{v} \right)^2 \cdot x^2 + 2 \cdot \frac{r_2 - r_1}{v} \cdot x \cdot r_1 + r_1^2 \, dx =$$

$$= \pi \cdot \left[\left(\frac{r_2 - r_1}{v} \right)^2 \cdot \frac{x^3}{3} + 2 \cdot \frac{r_2 - r_1}{v} \cdot r_1 \cdot \frac{x^2}{2} + r_1^2 \cdot x \right]_0^v =$$

$$= \pi \cdot \left[\frac{(r_2 - r_1)^2}{\cancel{v^2}} \cdot \frac{v^{\cancel{3}}}{3} + \cancel{2} \frac{r_2 - r_1}{\cancel{v}} \cdot r_1 \cdot \frac{v^{\cancel{2}}}{\cancel{2}} + r_1^2 \cdot v - 0 \right] =$$

$$= \pi \cdot \left[(r_2^2 - 2 r_1 r_2 + r_1^2) \cdot \frac{v}{3} + (r_2 - r_1) \cdot r_1 \cdot v + r_1^2 \cdot v \right] =$$

$$= \pi \cdot \left[\frac{r_2^2 v}{3} - \frac{2 r_1 r_2 v}{3} + \frac{r_1^2 v}{3} + r_1 r_2 v \cancel{- r_1^2 v + r_1^2 v} \right]$$

$$= \pi \cdot \frac{v}{3} \left[r_2^2 - 2 r_1 r_2 + r_1^2 + 3 r_1 r_2 \right] =$$

$$= \frac{\pi v}{3} \cdot \left(r_2^2 + r_1 r_2 + r_1^2 \right)$$

$$P = 2\pi \cdot \int_a^b f(x) \cdot \sqrt{1 + (f'(x))^2}\, dx = \left|\; f'(x) = \frac{r_2 - r_1}{v} \;\right| =$$

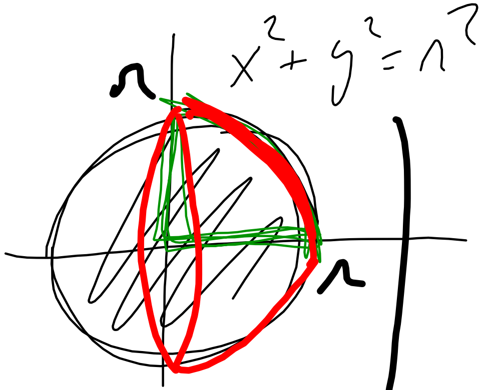
$$= 2\pi \cdot \int_0^v \left(\frac{r_2 - r_1}{v} \cdot x + r_1\right) \cdot \underbrace{\sqrt{1 + \left(\frac{r_2 - r_1}{v}\right)^2}}\, dx =$$

$$= 2\pi \sqrt{\frac{v^2 + (r_2 - r_1)^2}{v^2}} \cdot \left[\frac{r_2 - r_1}{v} \cdot \frac{x^2}{2} + r_1 \cdot x\right]_0^v =$$

$$= 2\pi \cdot \frac{\sqrt{v^2 + (r_2 - r_1)^2}}{v} \cdot \left(\frac{r_2 - r_1}{\cancel{v}} \cdot \frac{v^{\cancel{2}}}{2} + r_1 v - 0\right) =$$

$$= 2\pi \cdot \frac{\sqrt{v^2 + (r_2 - r_1)^2}}{v} \cdot \left(r_2 \frac{v}{2} - r_1 \frac{v}{2} + r_1 v\right) =$$

$$= 2\pi \cdot \sqrt{v^2 + (r_2 - r_1)^2} \cdot \underbrace{\left(\frac{r_2}{2} - \frac{r_1}{2} + r_1\right)}_{r_2 - r_1 + 2r_1} = \pi \cdot \sqrt{v^2 + (r_2 - r_1)^2} \cdot (r_1 + r_2)$$



$$S = 4 \cdot \int_0^r \sqrt{r^2 - x^2}\, dx$$

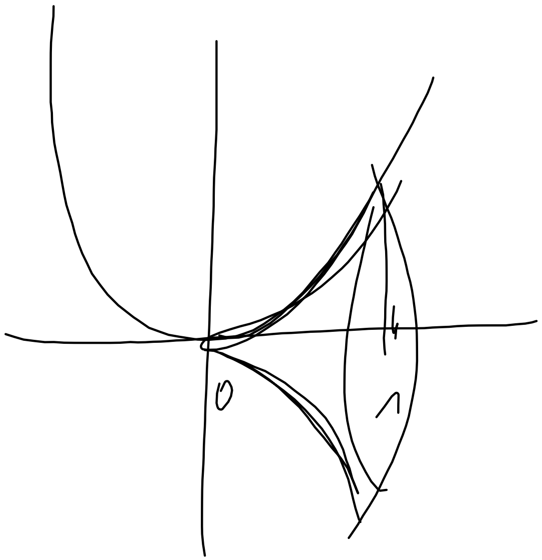
$$y = \sqrt{r^2 - x^2}$$

$$V_{KOULE} = 2\pi \cdot \int_0^r r^2 - x^2 \, dx = \dots$$

$$= 2\pi \cdot \left[r^2 x - \frac{x^3}{3} \right]_0^r =$$

$$= 2\pi \cdot \left(r^2 \cdot r - \frac{r^3}{3} - 0 \right) = 2\pi \cdot \left(r^3 - \frac{r^3}{3} \right) = 2\pi \cdot \frac{2}{3} r^3 =$$

$$= \frac{4}{3} \pi r^3$$



$$\pi \cdot \int_0^1 (x^2)^2 \, dx$$