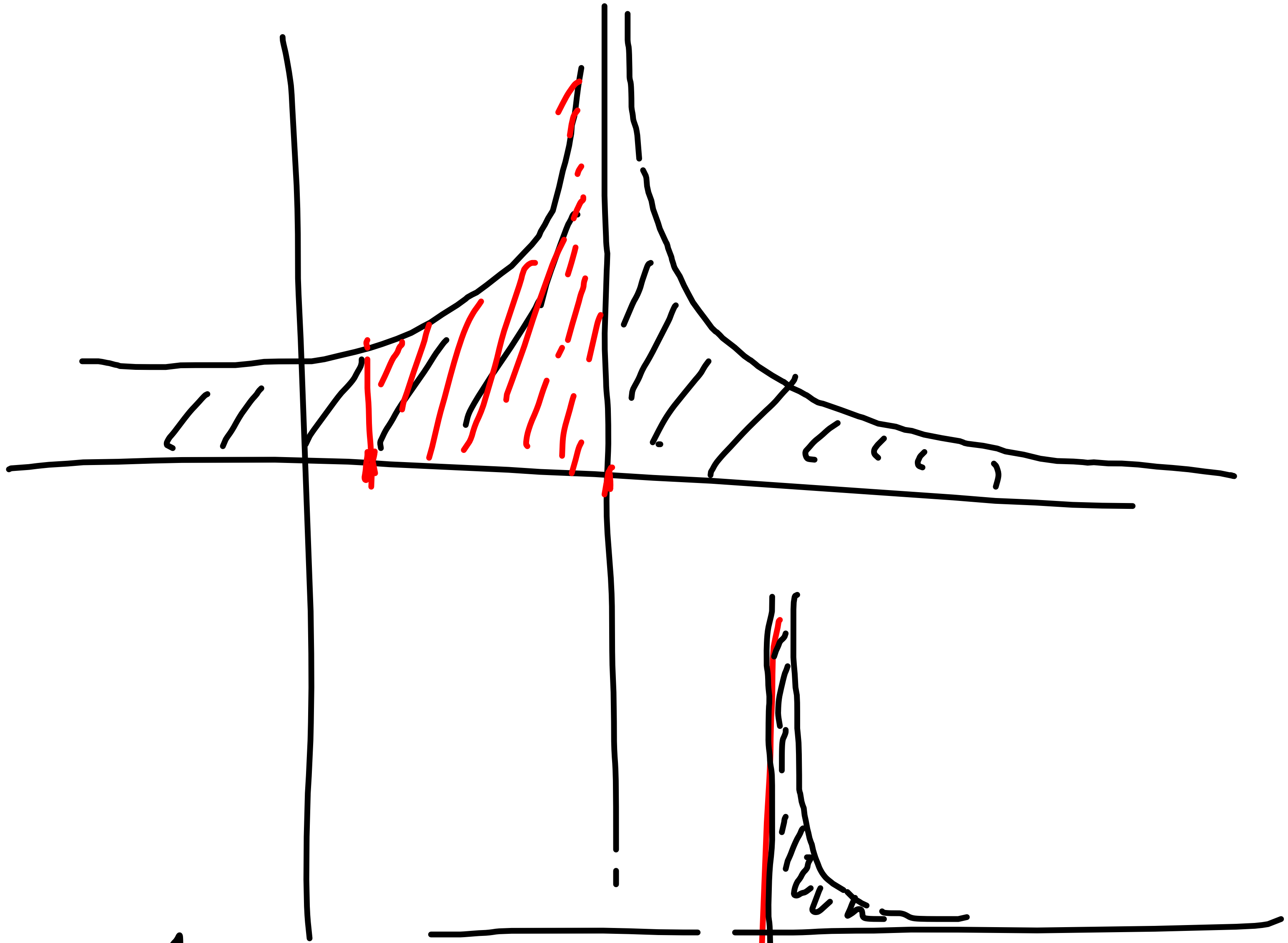
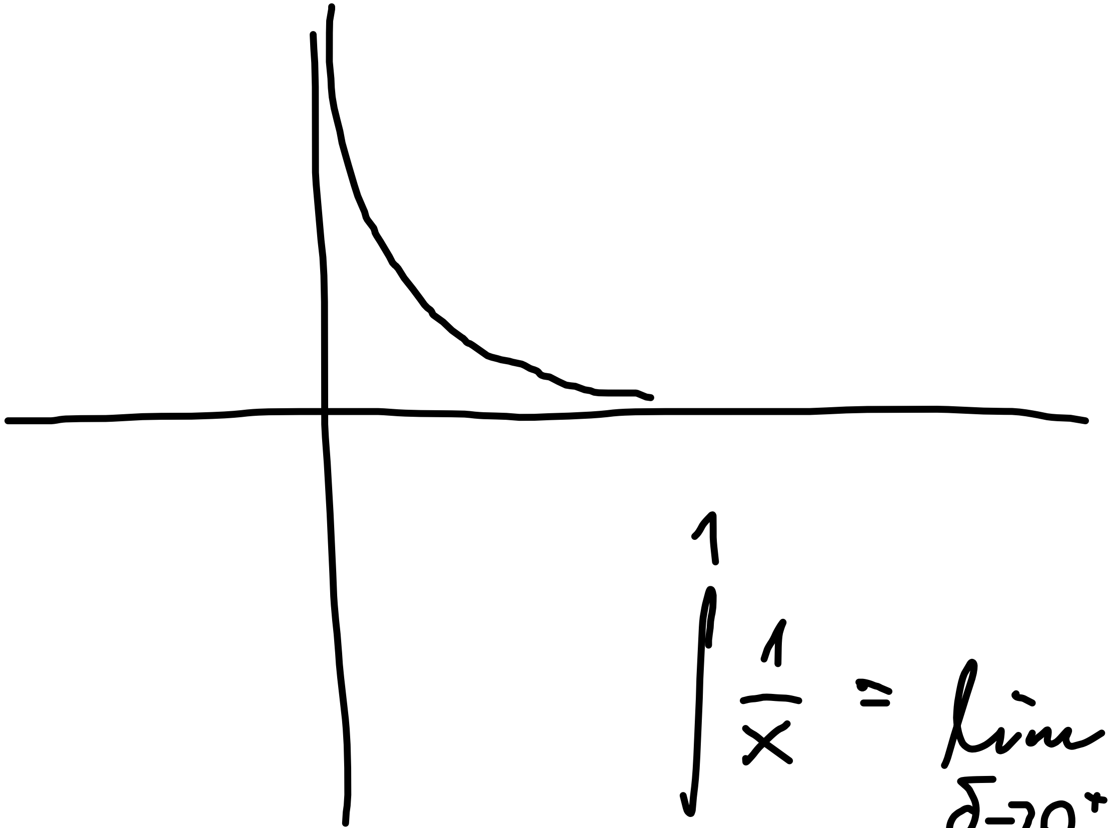


$$\int_0^1 \frac{1}{\sqrt{x}}\,dx = \lim_{\delta \to 0^+} \int_\delta^1 \frac{1}{\sqrt{x}} = \lim_{\delta \to 0^+} \left[2\sqrt{x}\right]_\delta^1 = 2 - 0 = 2$$



$$\int_0^1 \frac{1}{x} = \lim_{\delta \to 0^+} \left[\ln(x) \right]_\delta^1 =$$

$$= \ln(1) - \lim_{\delta \to 0^+} \ln(\delta) = \infty$$

$$\int_0^2 \frac{dx}{\sqrt[4]{2-x}} = \lim_{\delta\to 0^+}\int_0^{2-\delta} \frac{dx}{\sqrt[4]{2-x}} =$$

$$[y = 2-x]$$

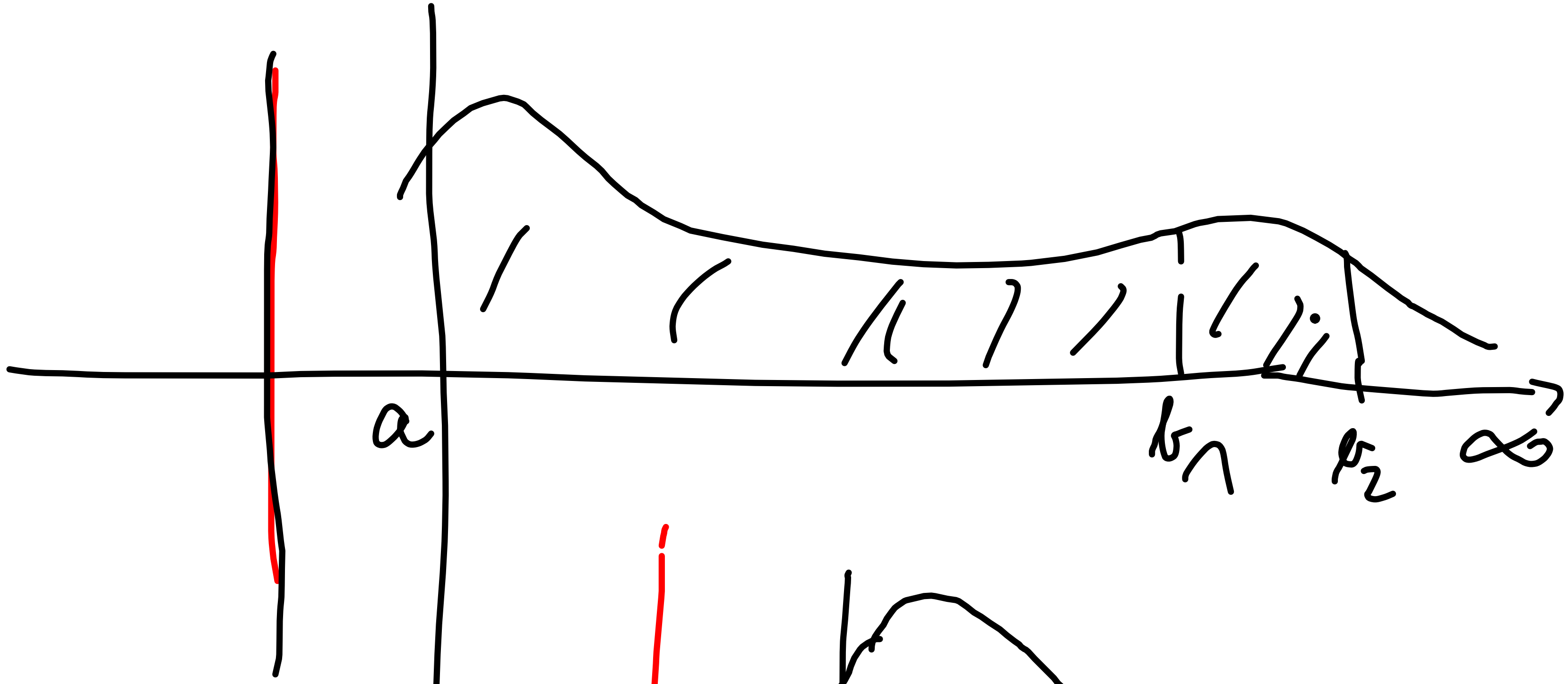
$$x=0 \Rightarrow y = 2-0 = 2$$

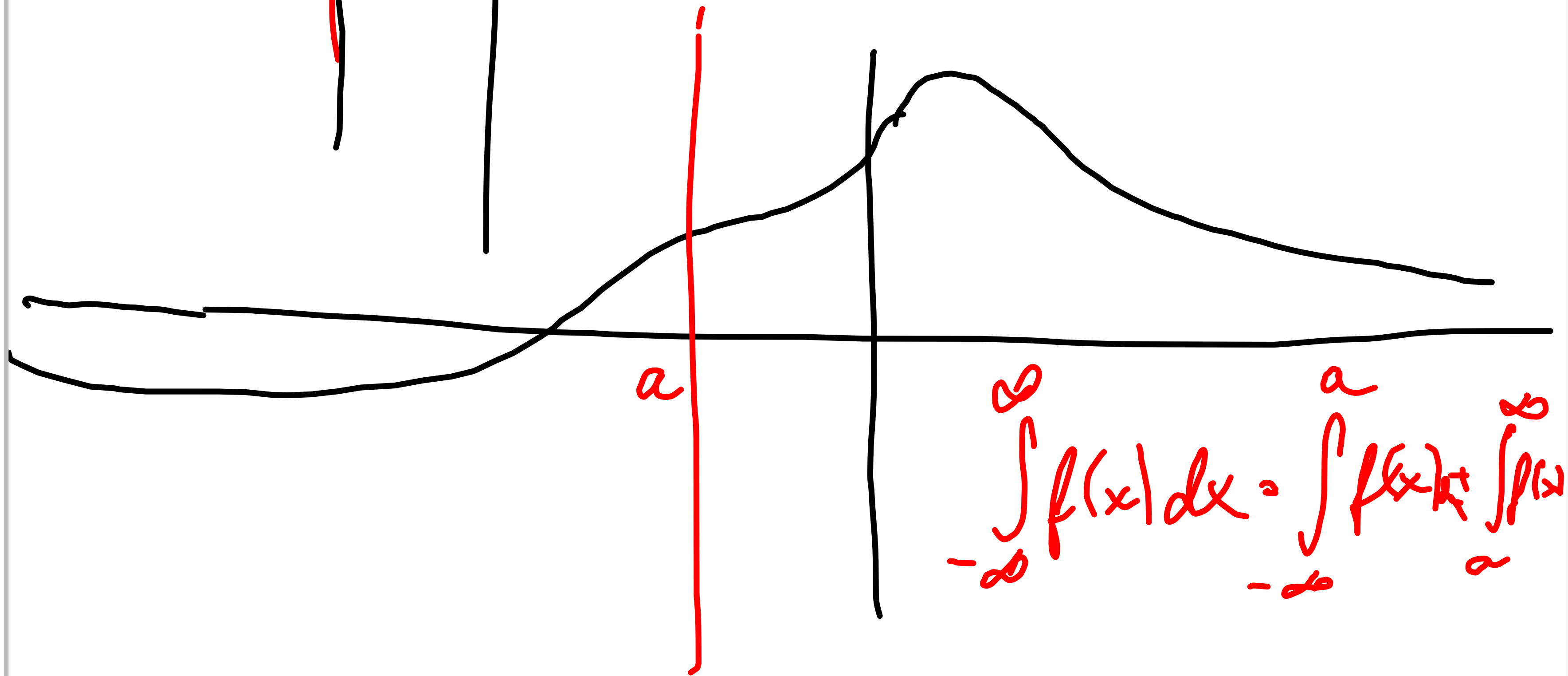
$$x = 2-\delta \Rightarrow y = 2-(2-\delta) = \delta$$

$$= \lim_{\delta\to 0^+}\int_2^{\delta} -\frac{1}{\sqrt[4]{y}}\,dy =$$

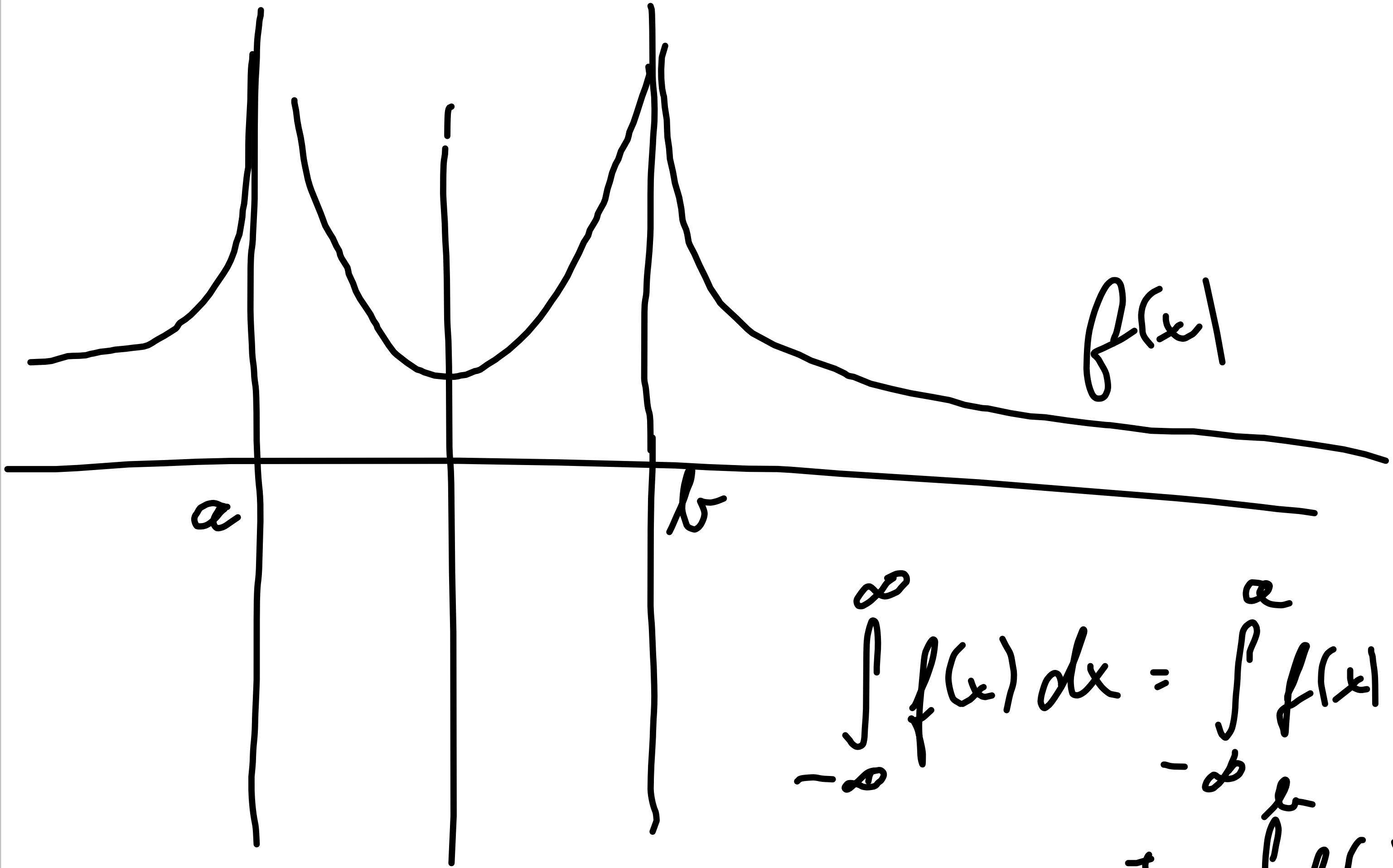
$$= \lim_{\delta\to 0^+}\int_\delta^2 \frac{1}{\sqrt[4]{y}}\,dy = \lim_{\delta\to 0^+}\frac{4}{3}\left[y^{\frac{3}{4}}\right]_\delta^2 = \lim_{\delta\to 0^+}\frac{4}{3}2^{\frac{3}{4}} - \frac{4}{3}\delta^{\frac{3}{4}} =$$

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

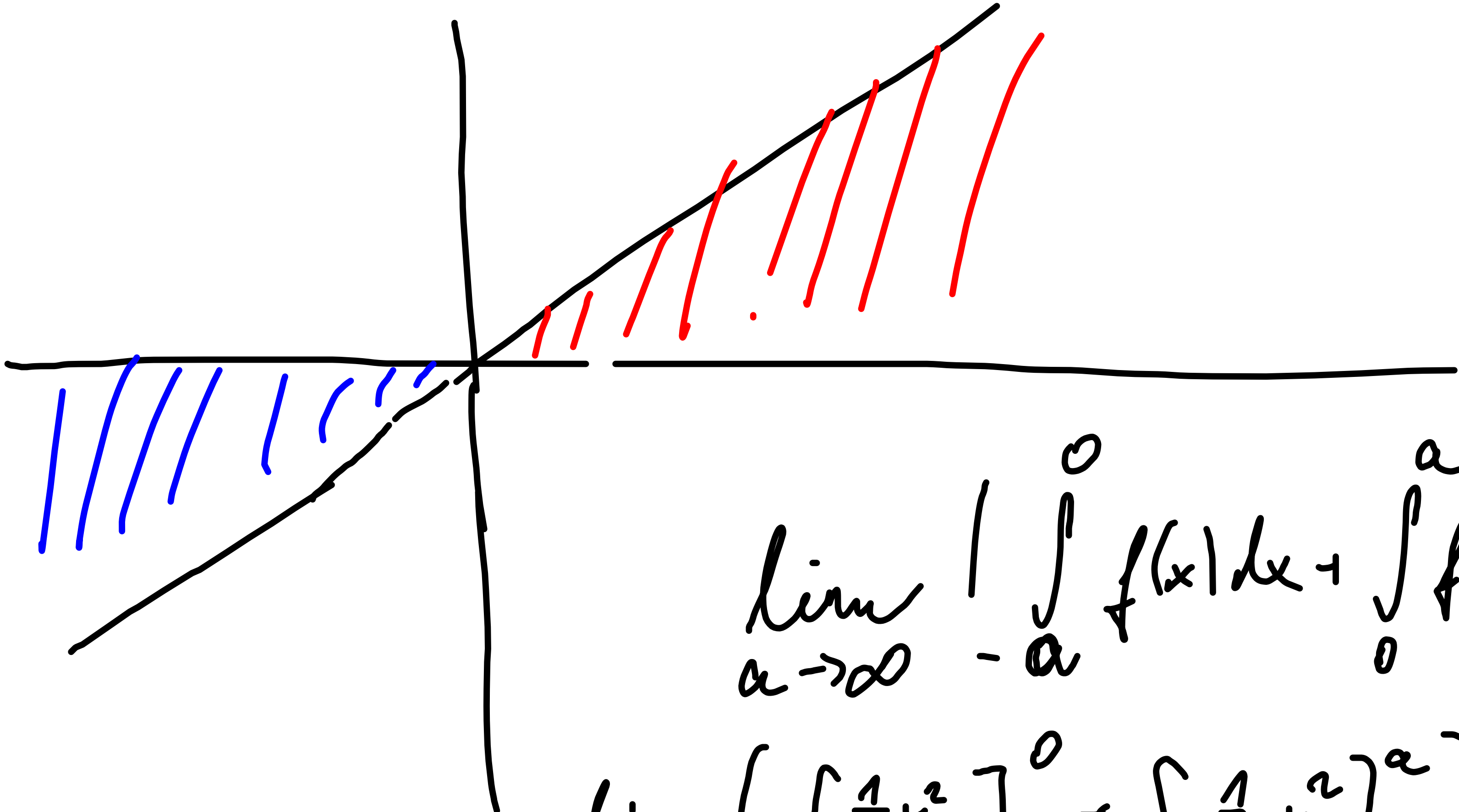




$$\int_{-\infty}^{\infty} f(x)\,dx = \int_{-\infty}^{a} f(x)\,dx + \int_{a}^{\infty} f(x)$$



$$\int_{-\infty}^{\infty} f(x)\,dx = \int_{-\infty}^{a} f(x)\,dx + \int_{a}^{b} f(x)\,dx + \int_{b}^{\infty} f(x)\,dx$$



$$\lim_{a\to\infty}\left(\int_{-a}^{0} f(x)\,dx+\int_{0}^{a} f(x)\,dx\right)$$

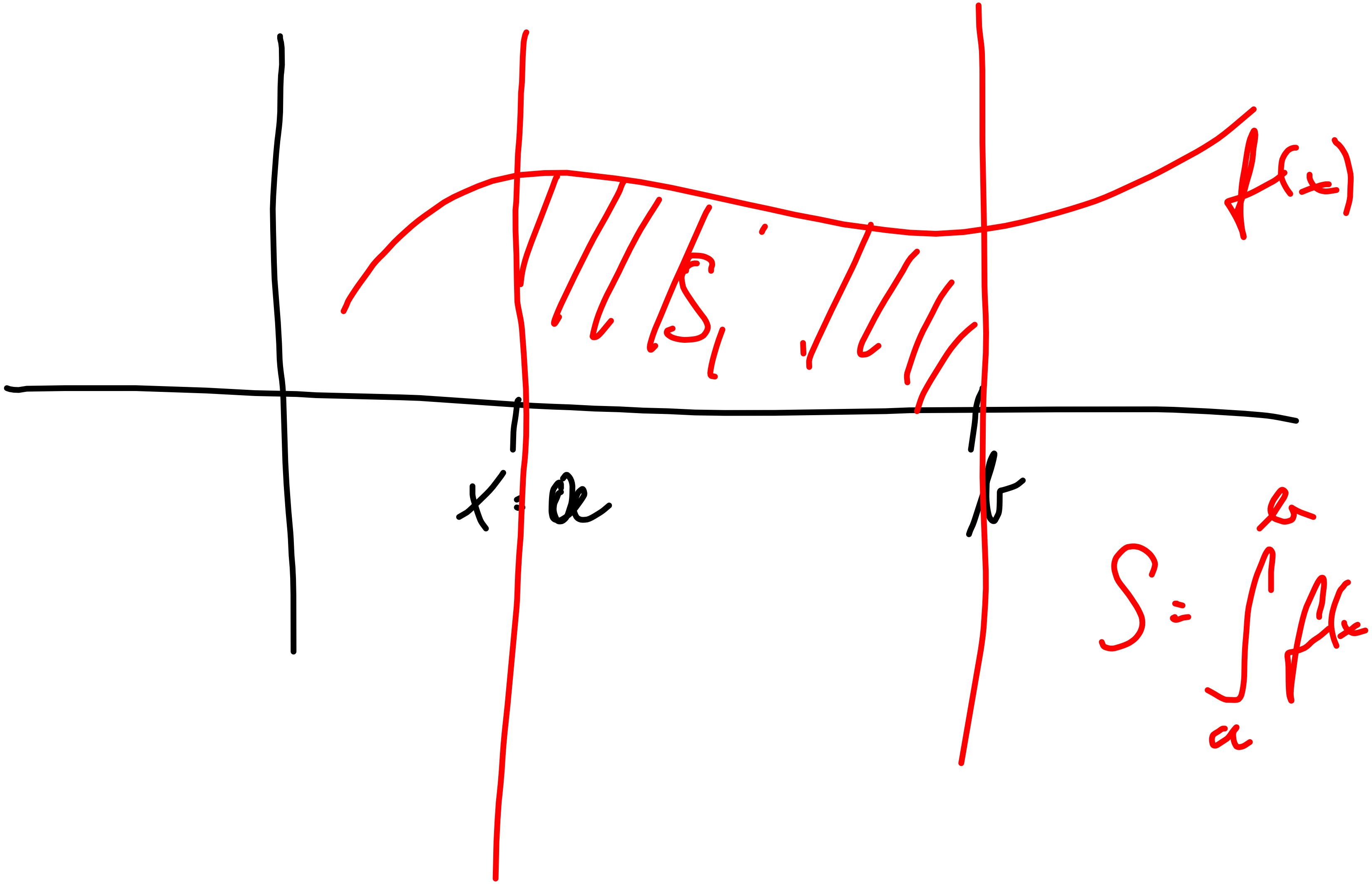
$$=\lim_{a\to\infty}\left(\left[\frac{1}{2}x^2\right]_{-a}^{0}+\left[\frac{1}{2}x^2\right]_{0}^{a}\right)=$$

$$=\lim_{a\to\infty} 0 = 0$$

$$\int_0^\infty \frac{x}{(x^2+a^2)^2}\,dx = \lim_{b\to\infty} \int_0^b \frac{x}{(x^2+a^2)^2}\,dx =$$

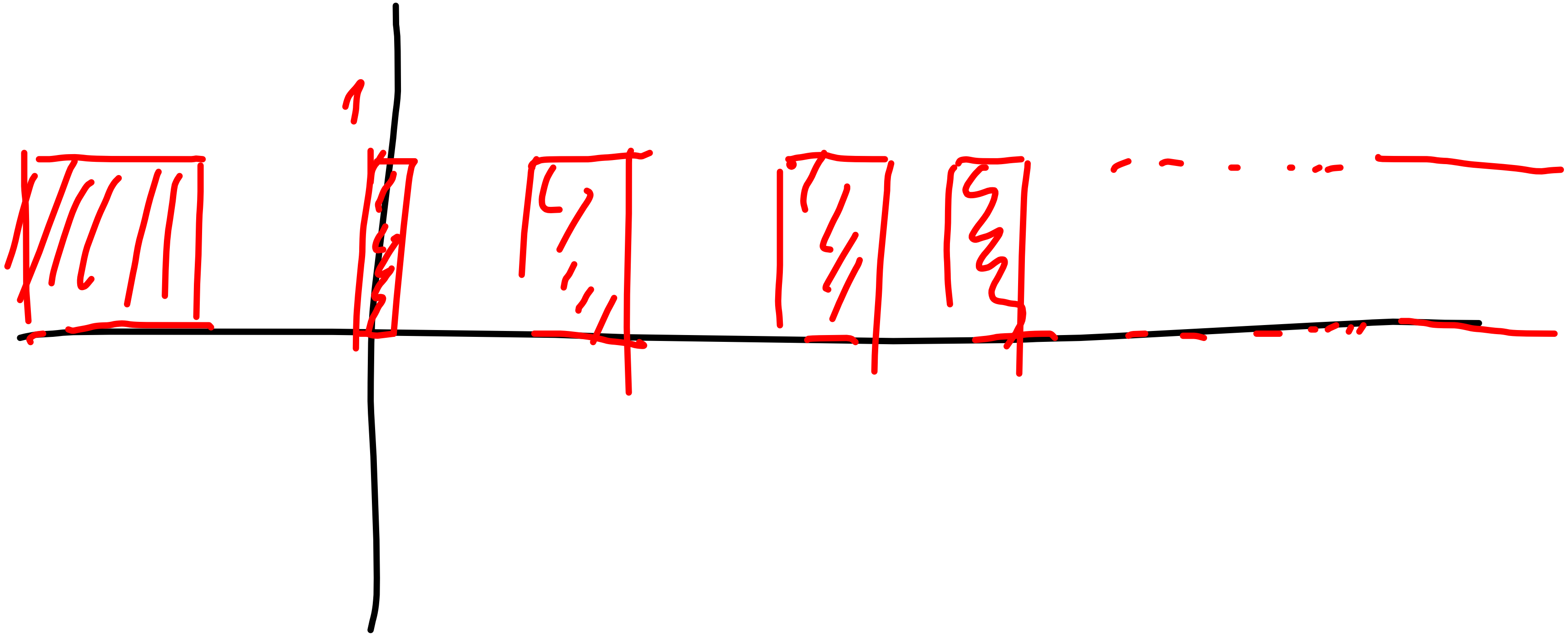
$$= \lim_{b\to\infty} -\frac{1}{2}\left[\frac{1}{x^2+a^2}\right]_0^b = -\frac{1}{2}\underbrace{\lim_{b\to\infty}\frac{1}{b^2+a^2}}_{\to 0} + \frac{1}{2}\frac{1}{a^2} =$$

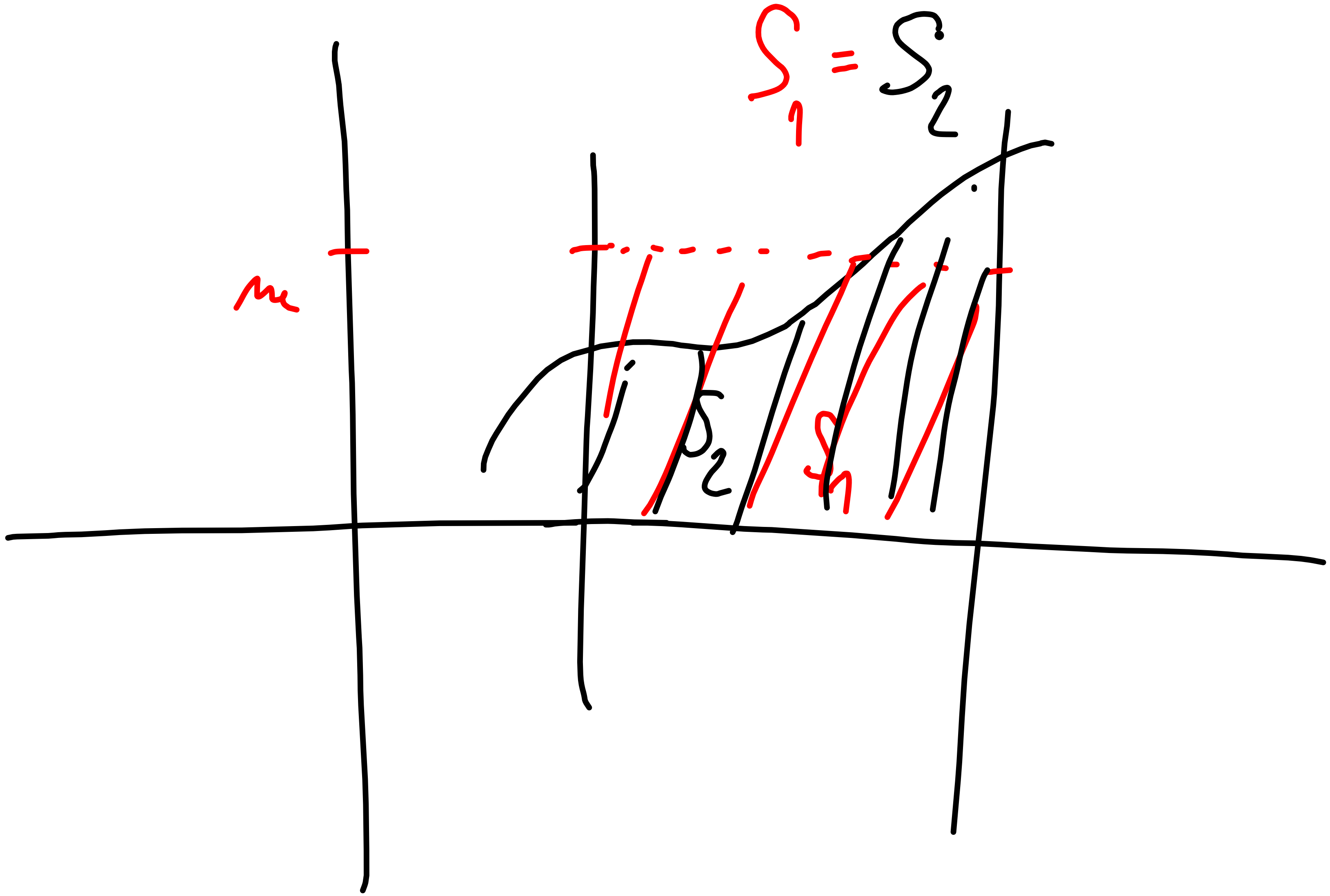
$$= \frac{1}{2a^2}$$



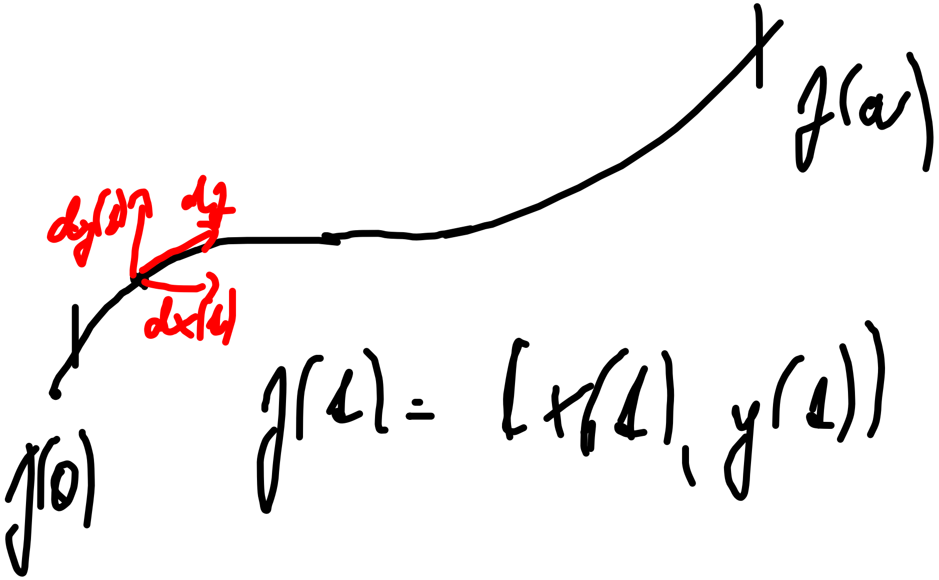
$$S = \int_a^b f(x)\,dx$$

$$\chi_A(x) = \begin{cases} 0 & \text{pro } x \notin A \\ 1 & \text{pro } x \in A \end{cases}$$

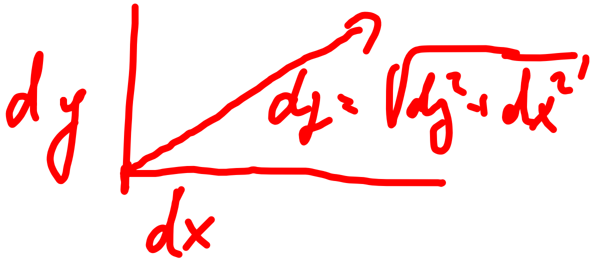




S1 = S2
m
S2
S1



$$\gamma(t) = (x(t), y(t))$$

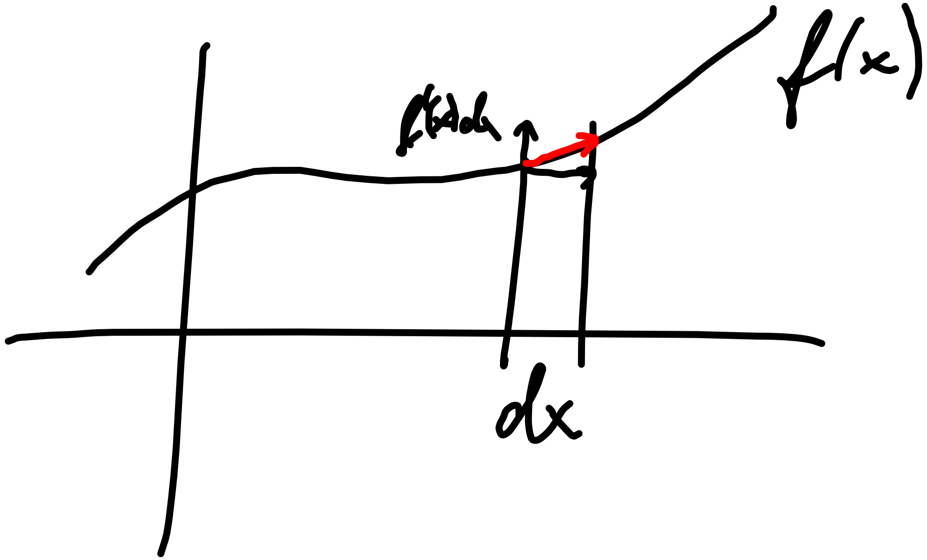


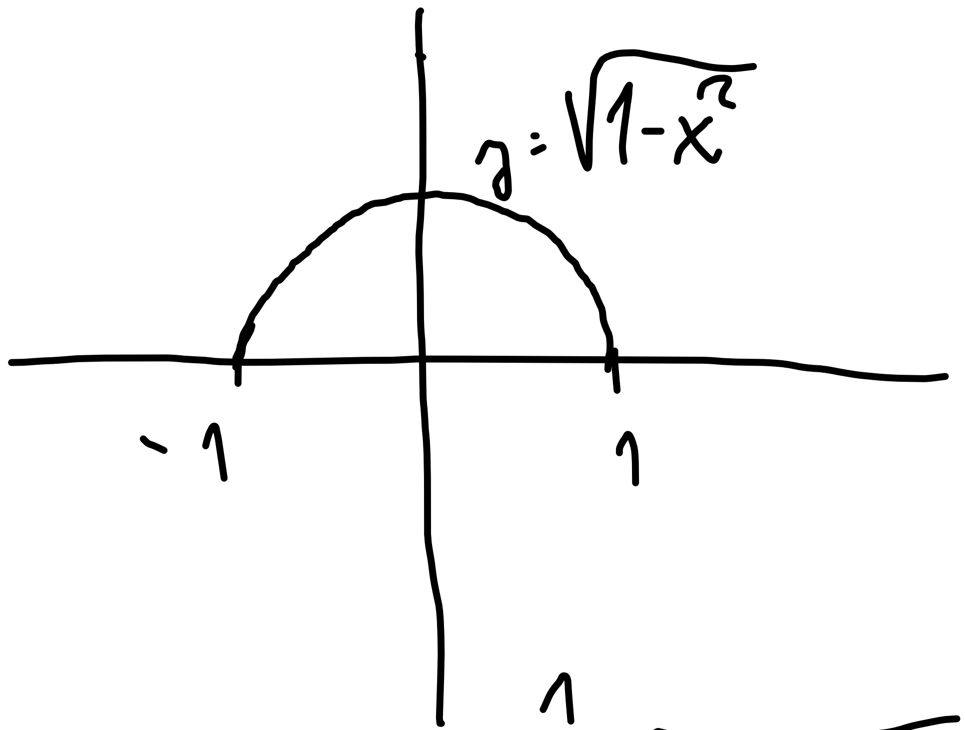
Délka křivky od $\gamma(0)$ do $\gamma(a)$

$$s = \int_0^a \sqrt{(x'(t))^2 + (y'(t))^2}\, dt$$

pro $x = 1$

$$s = \int_0^a \sqrt{1 + (y'(x))^2}\, dx$$





$$s = \int_{-1}^{1} \sqrt{1 + \frac{x^2}{1-x^2}}\, dx = \int_{-1}^{1} \sqrt{\frac{1}{1-x^2}}\, dx =$$

$$= \left[\arcsin\right]_{-1}^{1} = \pi$$

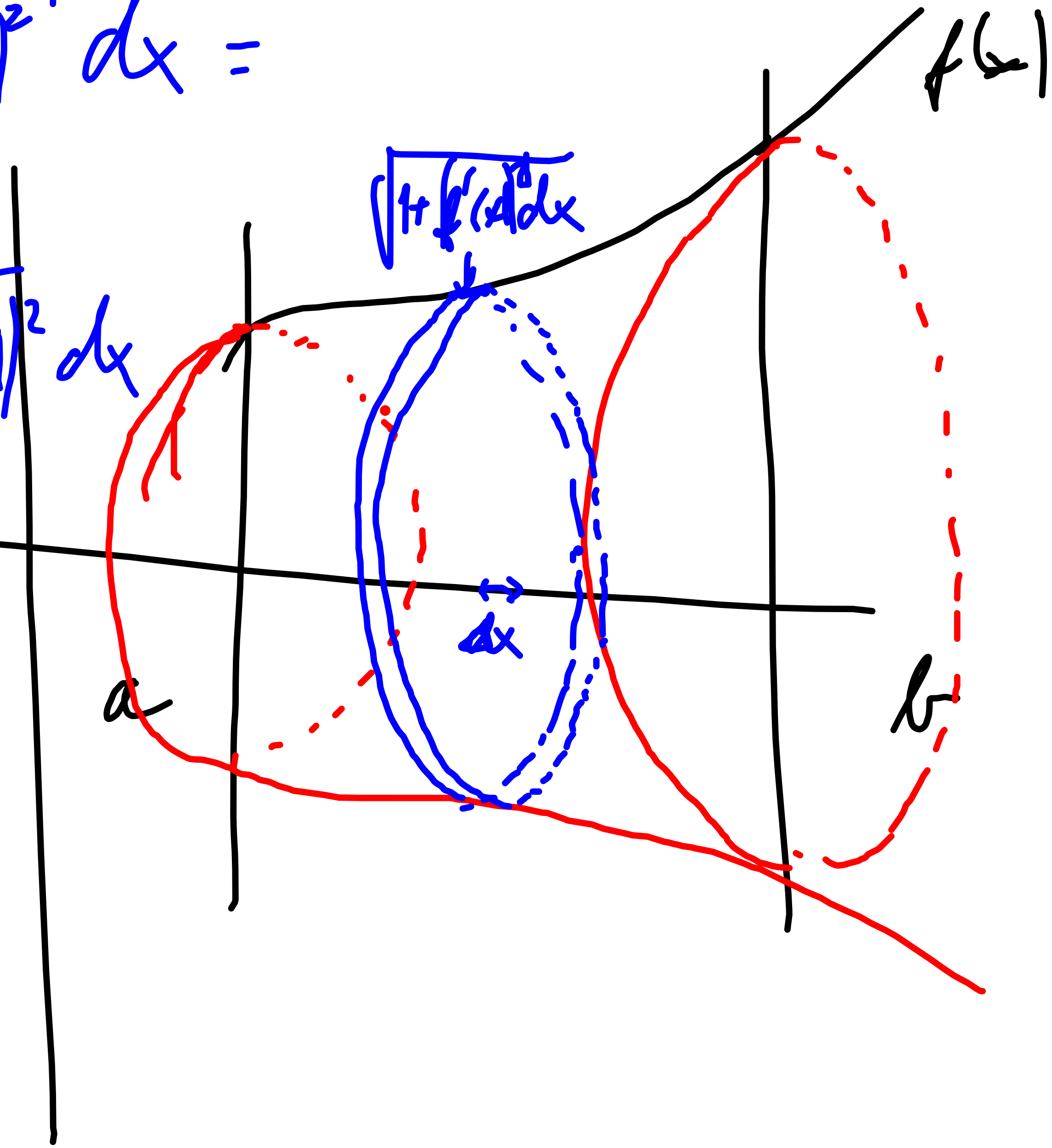
Obsah kruhu o poloměru r:

$$S(r) = 2\int_{-r}^{r} \sqrt{r^2 - x^2}\,dx = 2r^2 \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos^2 t\,dt$$

$$= 2\pi r^2$$

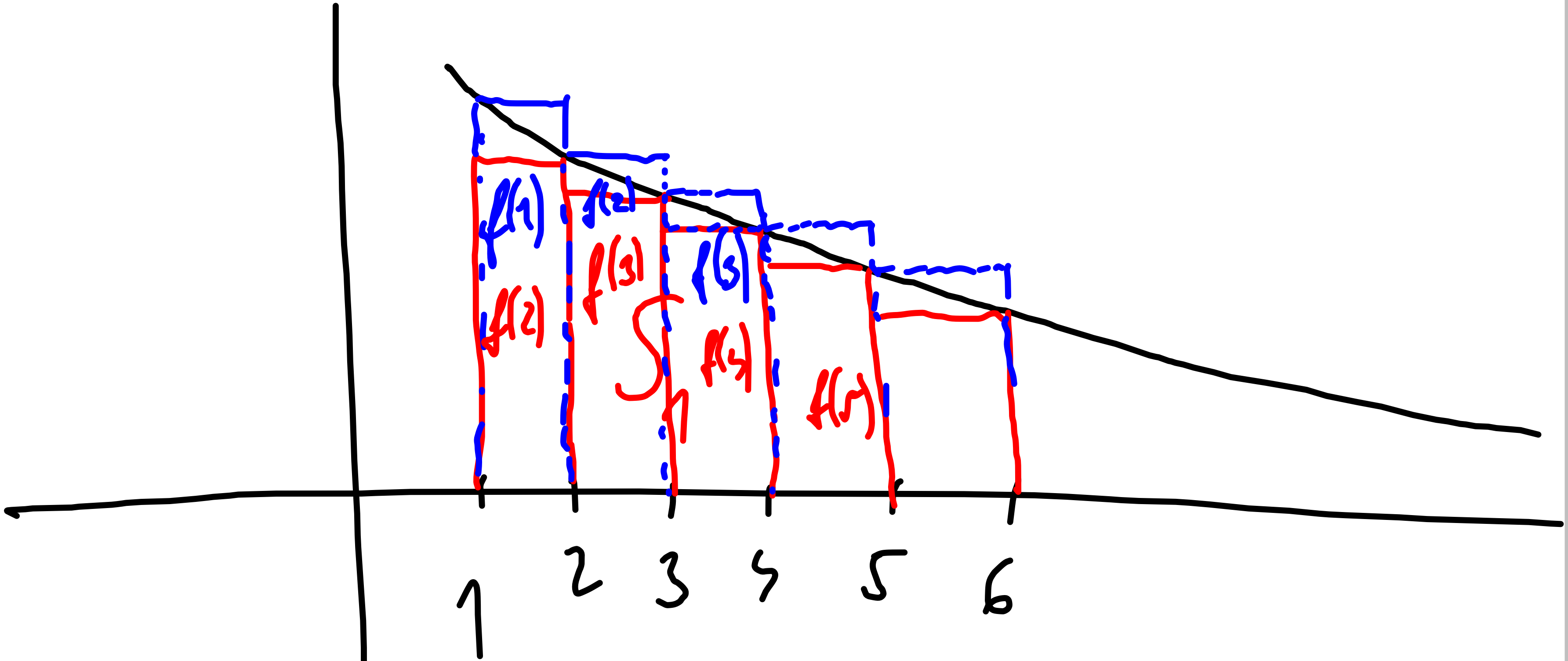
$$\int_a^b \left(2\pi f(x)\right)\sqrt{1+[f'(x)]^2}\,dx = 2\pi\int_a^b f(x)\sqrt{1+(f'(x))^2}\,dx$$

$$V=\int_a^b \left(\pi f^2(x)\right)dx$$



$$A_r = 2\pi \int_{-r}^{r} r\sqrt{1-\left(\frac{x}{r}\right)^2}\,\frac{1}{\sqrt{1-(x/r)^2}}\,dx =$$

$$= 2\pi r \int_{-r}^{r} dx = 4\pi r^2$$



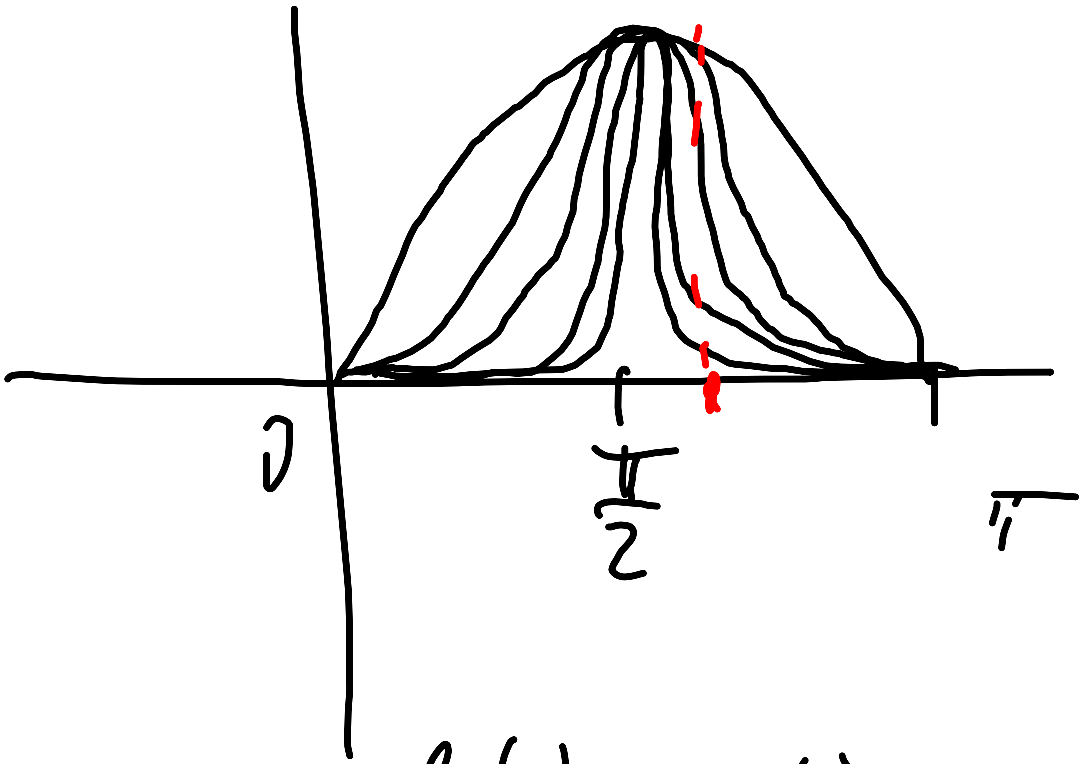
$$S_1 \le \int_1^\infty f(x)\,dx \le S_2$$

$$\sum_{n=2}^\infty f(n) = S_1 \qquad\qquad \sum_{n=1}^\infty f(n) = S_2$$

$$\int_1^{\infty} \frac{1}{x^k}\,dx = \lim_{b \to \infty} \Big[\underbrace{(1-k)\,x^{1-k}}_{\substack{\to\ \infty \text{ pro } k<1 \\ \to\ 0 \text{ pro } k>1}}\Big]_1^b =$$

$$= \begin{cases} k-1 & \text{pro } k > 1 \\ \infty & \text{pro } k < 1 \end{cases}$$

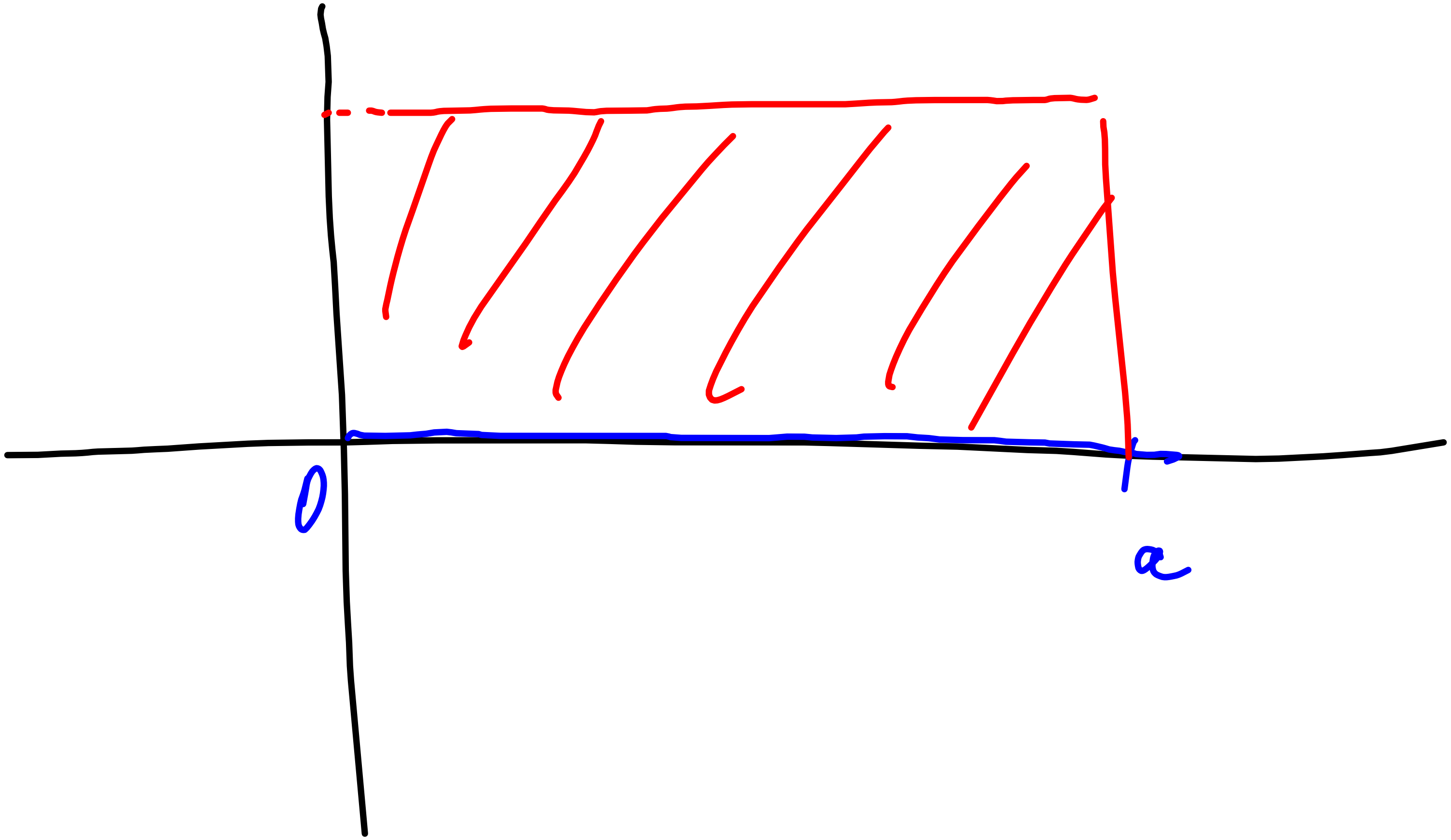
$$\int_1^{\infty} \frac{1}{x^2}\,dx = 1$$



$$f_1(x) = \sin(x)$$

$$f_2(x) = \sin^2(x) - \sin(x)$$

$$f_3(x) = \sin^3 x - (\sin^2(x) - \sin(x))$$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