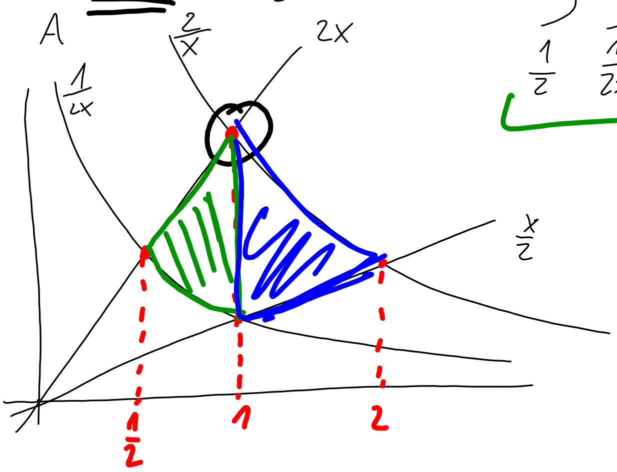
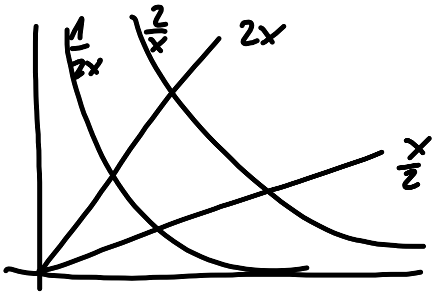
$$\iint_A x^2 y^2 \, dx \, dy = ?$$



$$\int_{\frac{1}{2}}^{1} \int_{\frac{1}{2x}}^{2x} x^2 y^2 \, dy \, dx + \int_{1}^{2} \int_{\frac{x}{2}}^{\frac{2}{x}} x^2 y^2 \, dy \, dx =$$

$$= \dots = \frac{63}{24} \cdot \ln 2$$



$$\boxed{\begin{array}{c} y = \frac{u}{x} \\ y = v \cdot x \end{array}}$$

$$\frac{\frac{1}{2}}{x} \ \ldots \ \frac{2}{x}$$

$$\frac{1}{2} \cdot x \ \ldots \ 2 \cdot x$$

$$\Rightarrow \ x = \frac{u}{y} = \frac{u}{v \cdot x} \Rightarrow x^2 = \frac{u}{v} \Rightarrow x = \sqrt{\frac{u}{v}}$$

$$y = \frac{u}{x} = \frac{u}{\frac{y}{v}} = \frac{u \cdot v}{y} \Rightarrow y^2 = u \cdot v \Rightarrow y = \sqrt{u \cdot v}$$

$x = \sqrt{\frac{u}{v}}\ ,\ y = \sqrt{u \cdot v}$

$|J| = \left| \begin{vmatrix} x_u & x_v \\ y_u & y_v \end{vmatrix} \right| = \ldots = \frac{1}{2v}$

$u = x \cdot y\ ,\ v = \frac{y}{x}$

$\tilde{J} = \begin{vmatrix} u_x & u_y \\ v_x & v_y \end{vmatrix} = \begin{vmatrix} y & x \\ -\frac{y}{x^2} & \frac{1}{x} \end{vmatrix} =$

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

$|J| = \frac{1}{2} \cdot \frac{x}{y} = \frac{1}{2} \cdot \frac{x}{v \cdot x} = \frac{1}{2v}$

$$y = \frac{1}{2x} \quad \dots \quad \sqrt{u \cdot v} = \frac{1}{2 \cdot \sqrt{\frac{u}{v}}} = \frac{1}{2} \cdot \sqrt{\frac{v}{u}}$$

$$\sqrt{u} = \frac{1}{2\sqrt{u}} \quad \dots \quad u = \frac{1}{2}$$

atd.

$$u \in \left[\frac{1}{2}, 2\right]$$

$$v \in \left[\frac{1}{2}, 2\right]$$

$$x^2 \cdot y^2 = \frac{u}{\cancel{v}} \cdot u \cdot \cancel{v} = u^2$$

$$\text{INT.} = \int_{\frac{1}{2}}^{2} \left(\int_{\frac{1}{2}}^{2} u^2 \cdot \frac{1}{2v} \, dv \right) du = \ldots = \frac{63}{24} \cdot \ln 2$$

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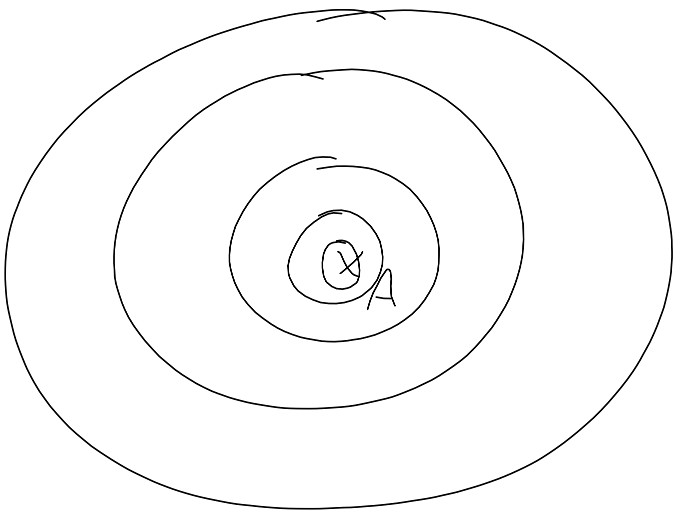
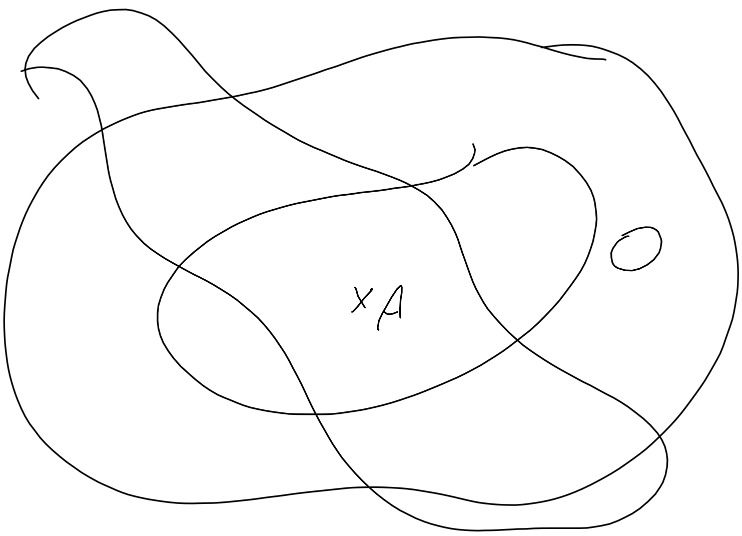
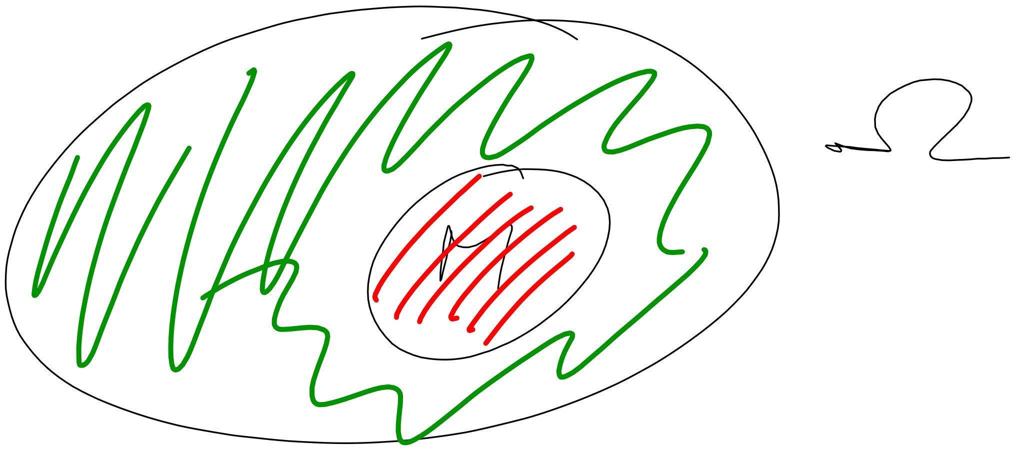
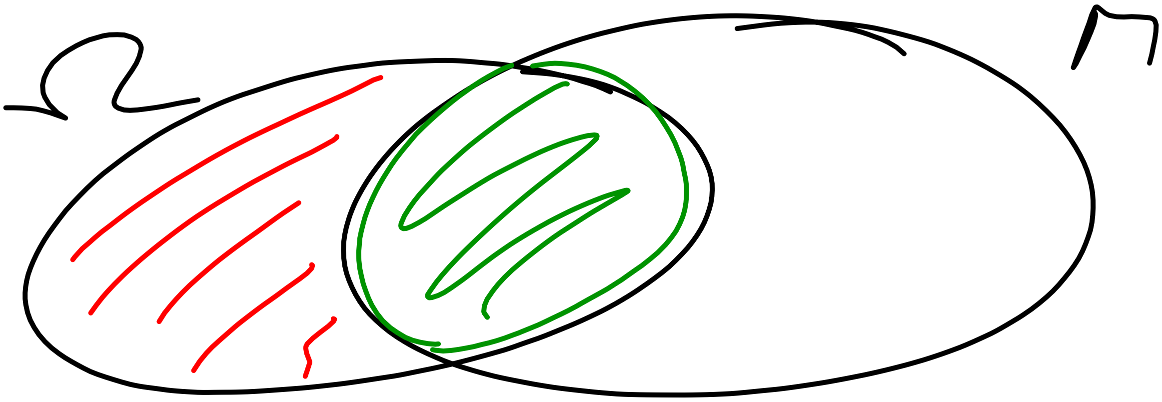



x A
O

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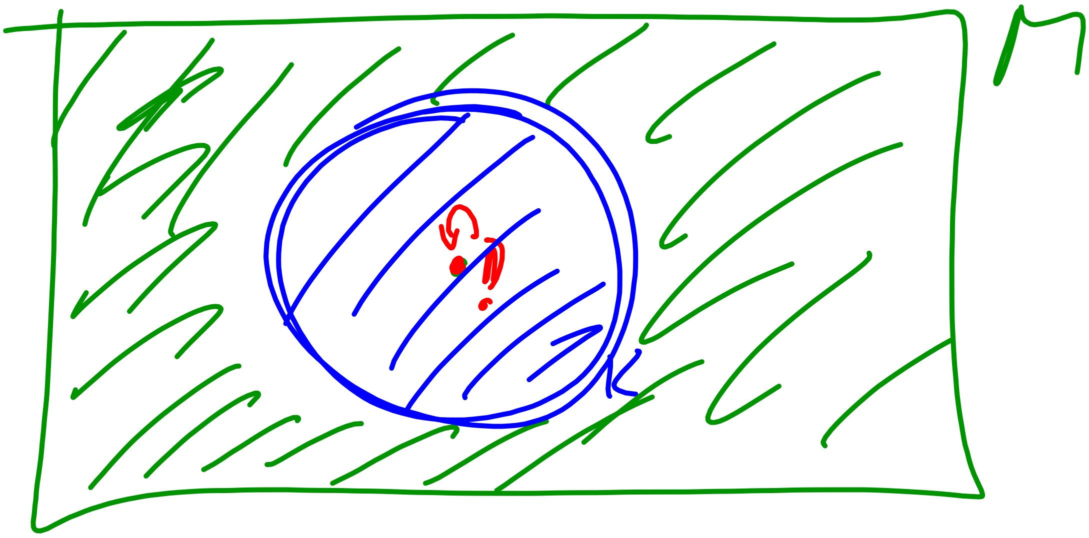
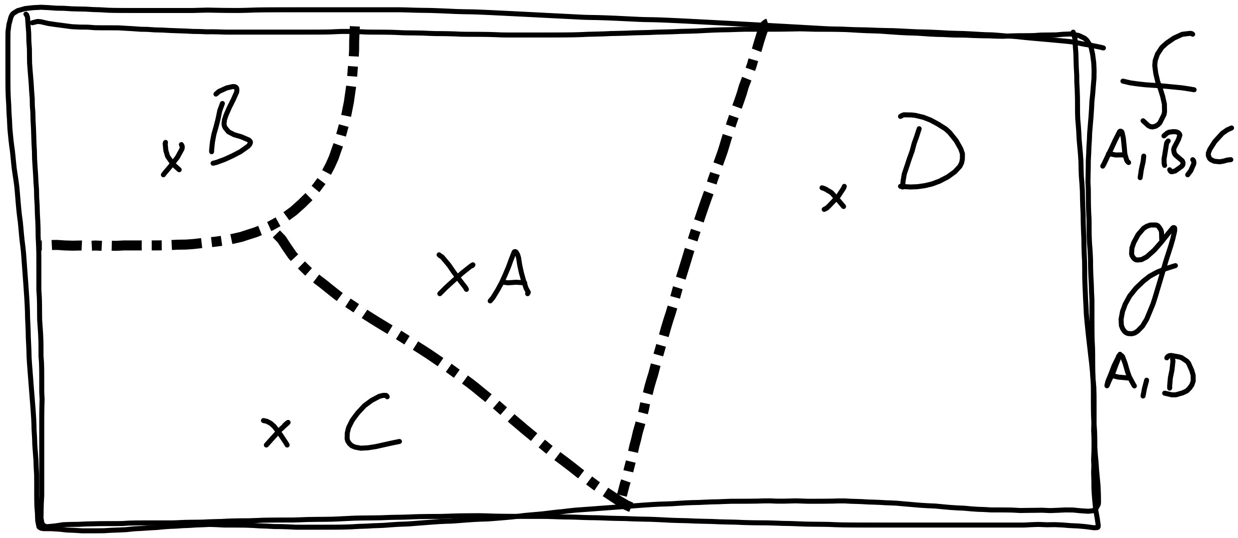
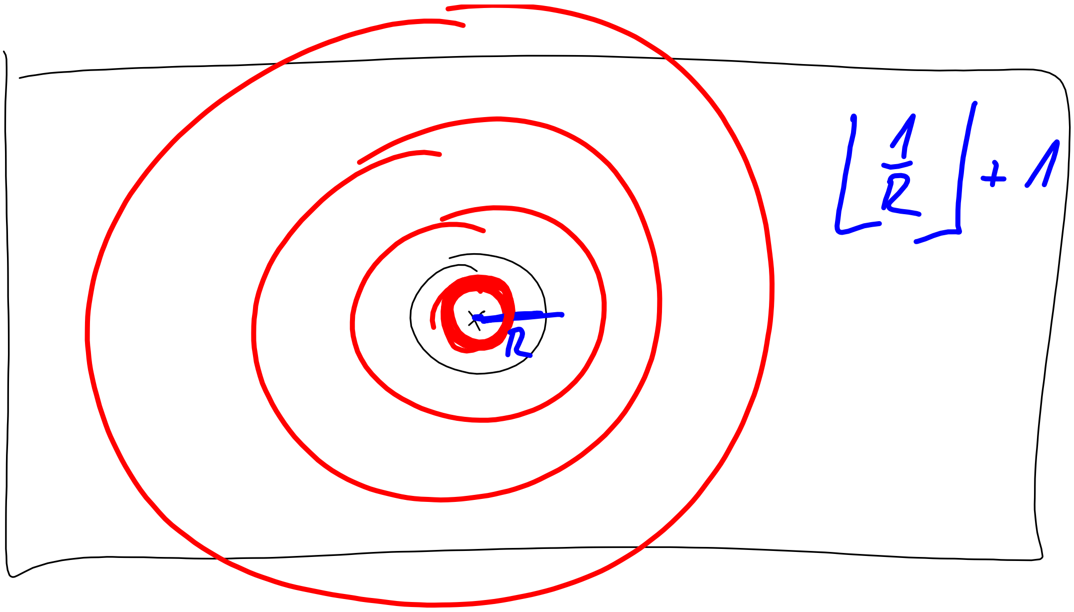
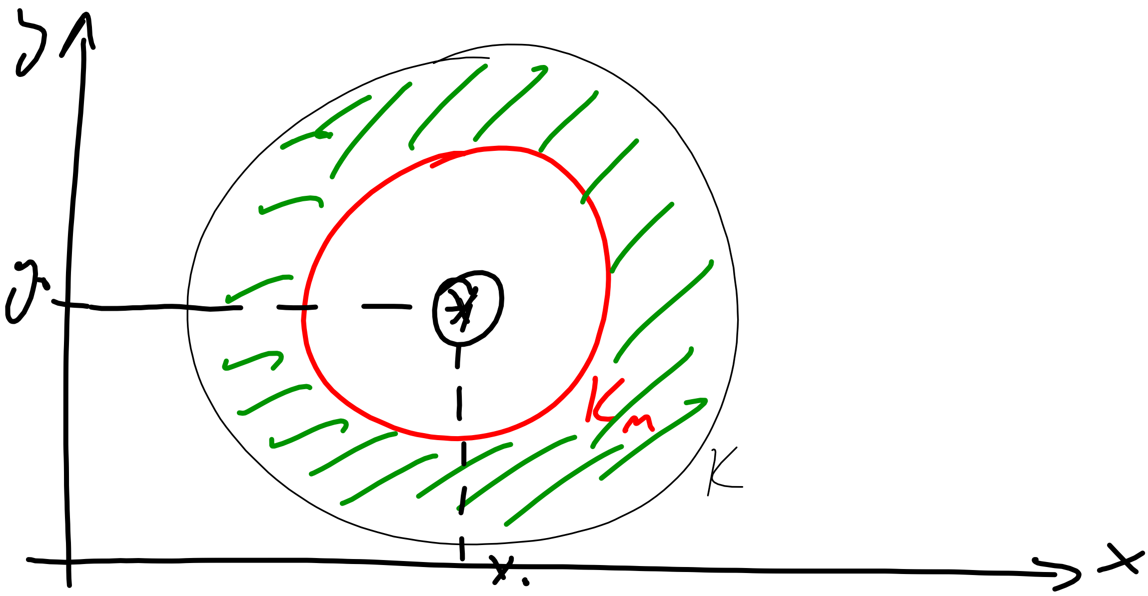



B
D
A
C
f
A, B, C
g
A, D



$\left\lfloor \frac{1}{R} \right\rfloor + 1$


y
y.
x.
x
K_m
K

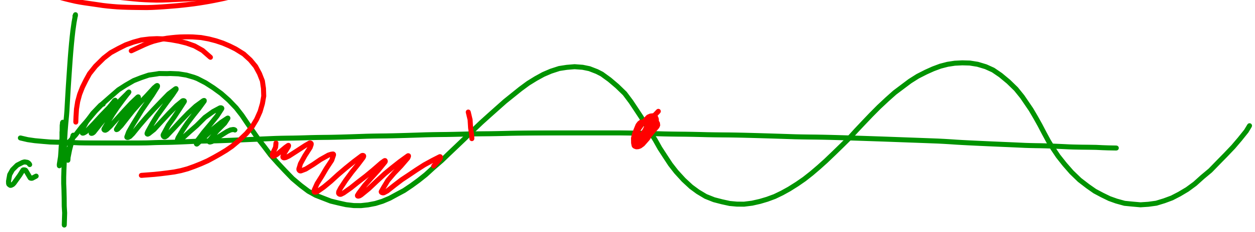
$$\int_0^{2\pi} \boxed{\int_{\frac{1}{n}}^{\pi} \varrho^{1-\alpha}\, d\varrho}\, d\varphi$$

DIR. KRIT.: $\exists k: \left|\int_a^b f(x)\,dx\right| \leq k \quad \forall b > a$

& $g \to 0$ MONOT. $\Rightarrow \int_a^\infty f \cdot g\,dx$ KONV.

$$\int_1^\infty \frac{\sin x}{x}\,dx$$

$f(x) = \sin x, \quad g(x) = \frac{1}{x}$



$$\int_1^\infty \left|\frac{\sin x}{x}\right| dx = \int_1^\infty \frac{|\sin x|}{x}\, dx$$

SPOREM PŘEDP. ŽE KONV.

$$\boxed{0 \leq \sin^2 x \leq |\sin x|}$$

$$\Downarrow$$

$$\Rightarrow \int_1^\infty \frac{\sin^2 x}{x}\, dx \text{ KONV.} \Rightarrow \int_1^\infty \frac{1}{x} \cdot \frac{1-\cos 2x}{2}\, dx =$$

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

$$\int_1^\infty \underbrace{\underbrace{\frac{1-\cos 2x}{x}}_{\text{KONV.}} + \underbrace{\frac{\cos 2x}{x}}_{\text{KONV.}}}_{\text{KONV.}}\, dx$$

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

KONV. DLE D.K.

$$\| \quad \int_1^\infty \frac{1}{x}\, dx \ \cancel{\text{KONV.}} \ \text{SPOR}$$