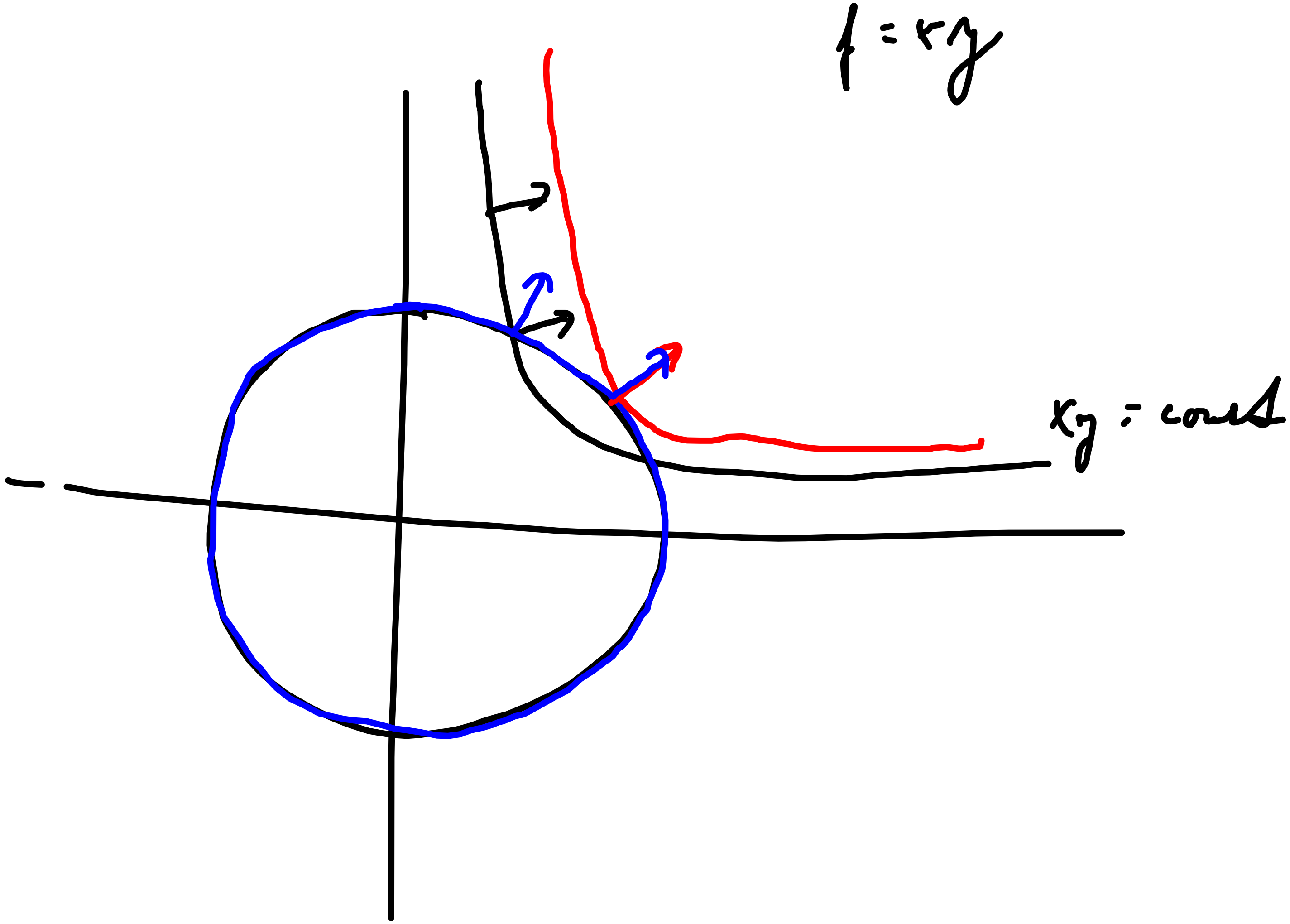
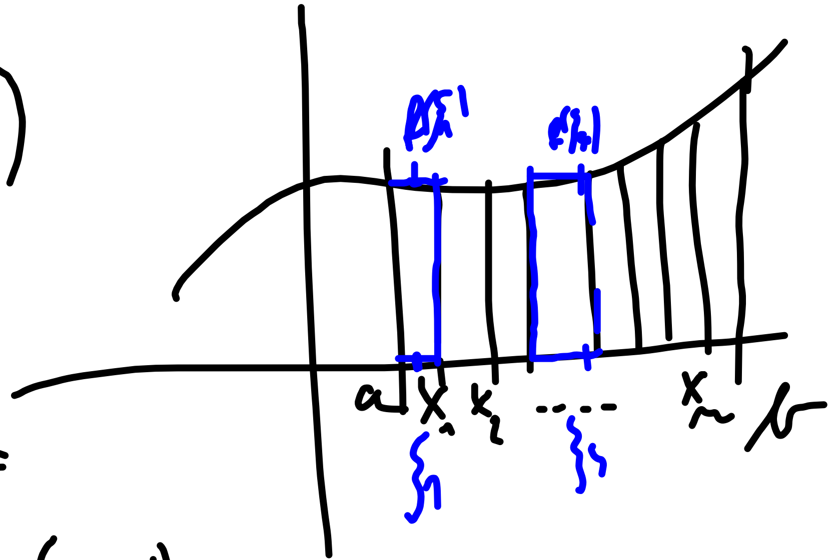


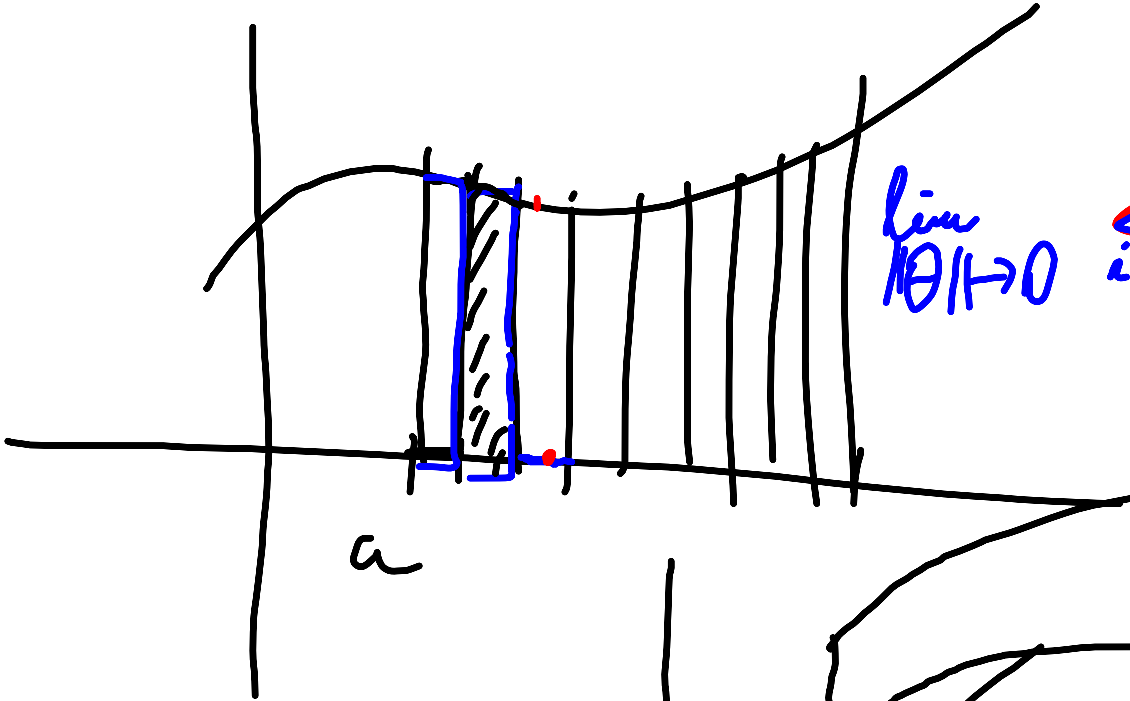
f = xy
xy = const

$$\frac{\partial}{\partial y}\int_a^b f(x,y)\,dx = \int_a^b \frac{\partial}{\partial y} f(x,y)\,dx$$

$$S_{\Theta,\xi} \quad \sum_i f(\xi_i)(x_{i+1}-x_i)$$

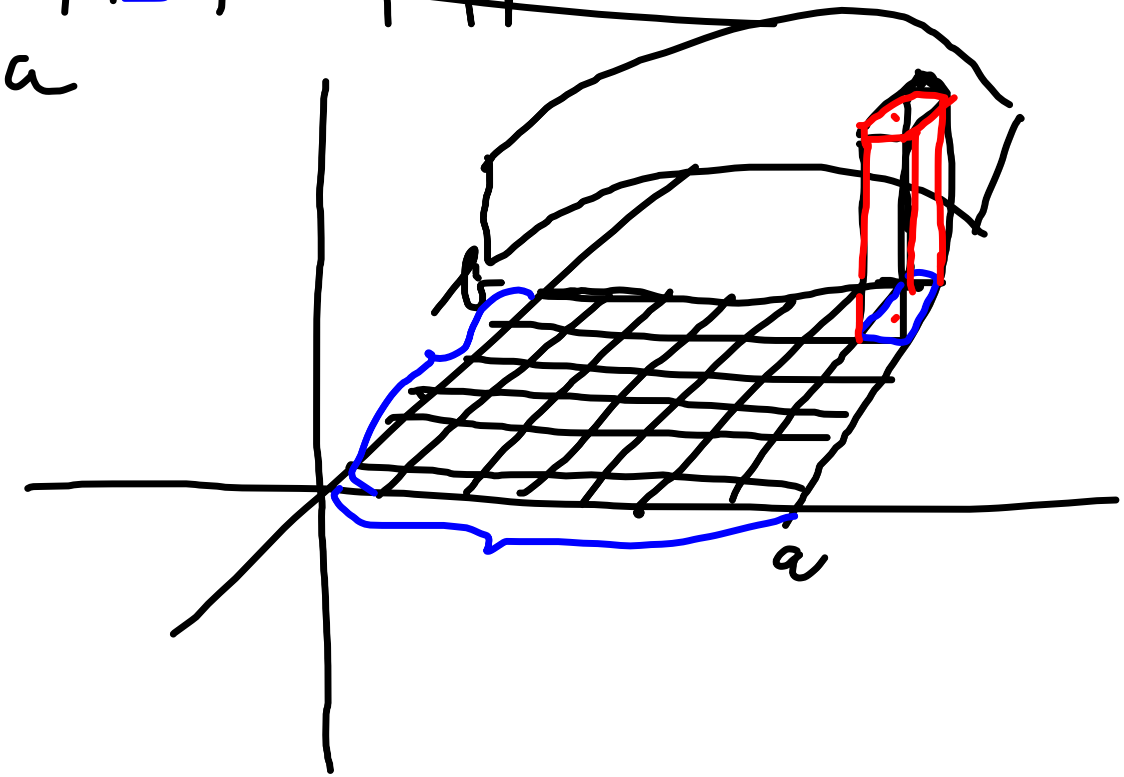


$$f(x,y+h)-f(x,y) = h\cdot\frac{\partial f}{\partial y}(x,\xi_i)$$



$$\lim_{\|\Theta\|\to 0} \sum_{i=1}^{n} f(\xi_i)\underbrace{(x_{i+1}-x_i)}$$

$$\xi_i \in (x_i, x_{i+1})$$



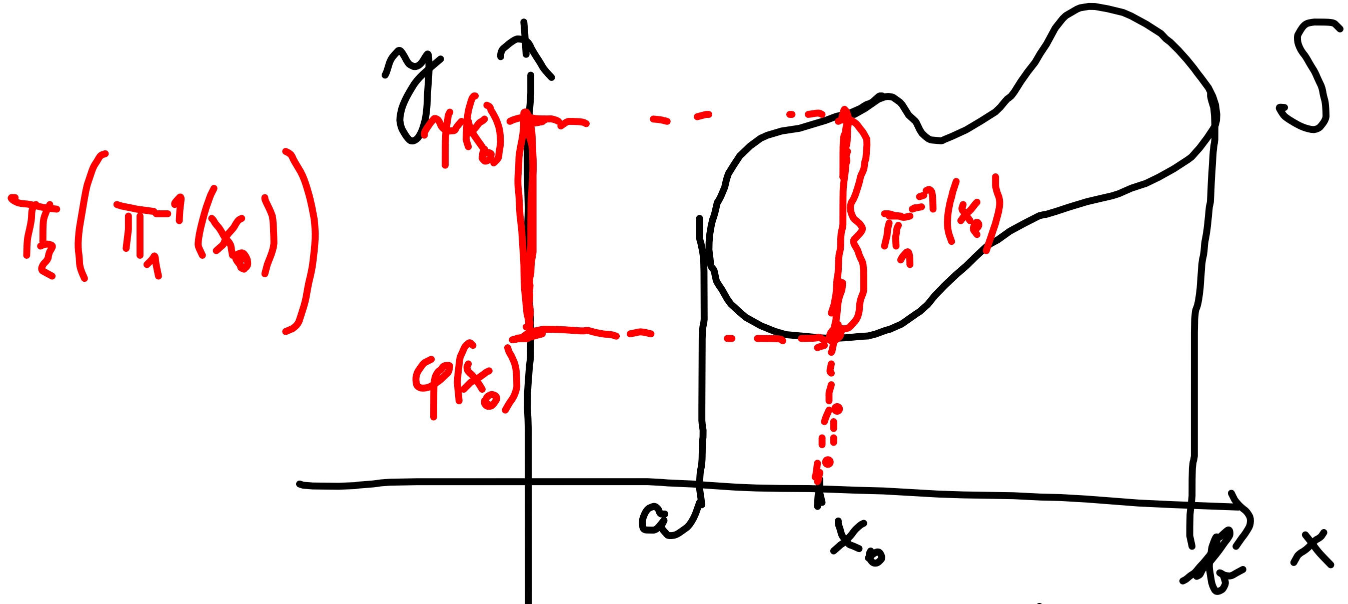
$$\underbrace{(c\cdot f+g)(\xi_i)(x_{i+1}-x_i)\cdots(r_{j+1}-r_j)} = \qquad c\in\mathbb{R}$$

$$= \underbrace{c\cdot f(\xi_i)(x_{i+1}-x_i)\cdots(r_{j+1}-r_j)} +$$

$$+ \underbrace{g(\xi_i)(x_{i+1}-x_i)\cdots(r_{j+1}-r_j)}$$

$$S = \{ (x_1, \dots, x_n) \in \mathbb{R} \mid x_1 \in \langle a, b \rangle,\ x_2 \in \langle \varphi(x_1), \psi(x_1) \rangle, \dots$$

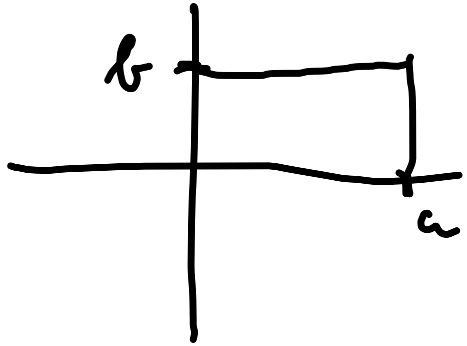
$$\dots x_n \in \langle \varphi(x_1, \dots, x_{n-1}), \psi(x_1, \dots, x_{n-1}) \rangle \}$$



$$\pi_1(S) = \langle a, b \rangle$$

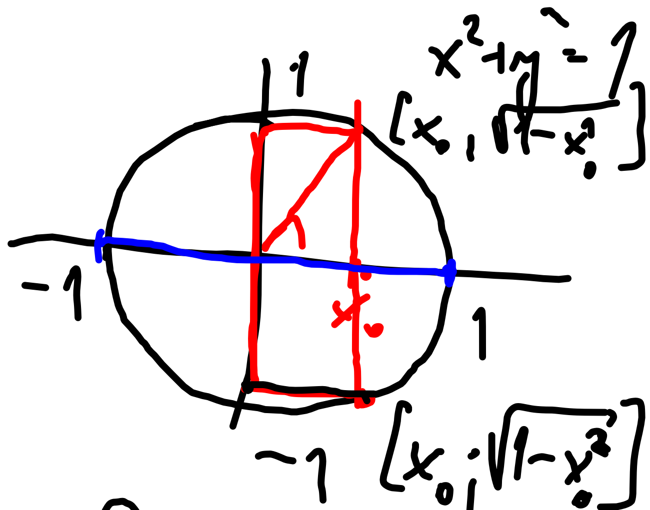
Obsah obdélníka o stranách a, b:

$$\int_0^b\int_0^a 1\cdot dx\,dy = a\cdot b$$



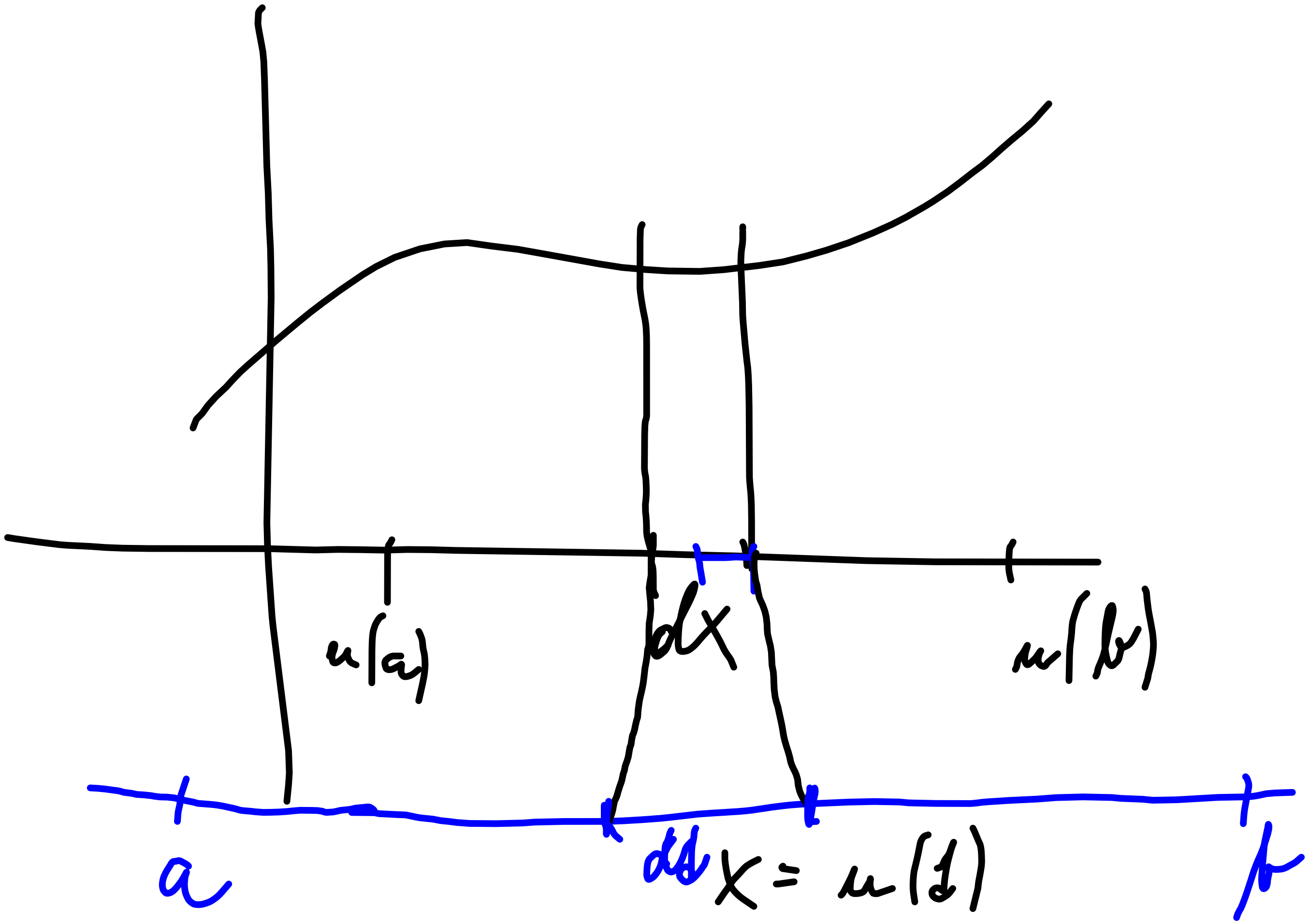
Obsah kruhu o poloměru 1

$$\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy\,dx = \underbrace{\int_{-1}^{1} 2\sqrt{1-x^2}}\; = \dots$$



$$S = (0,2\pi)\times(0,1)$$

$$= \int_0^{2\pi}\int_0^1 r\,dr\,d\varphi = \int_0^{2\pi}\frac{1}{2}\,d\varphi = \pi$$



$$x = u(t)$$

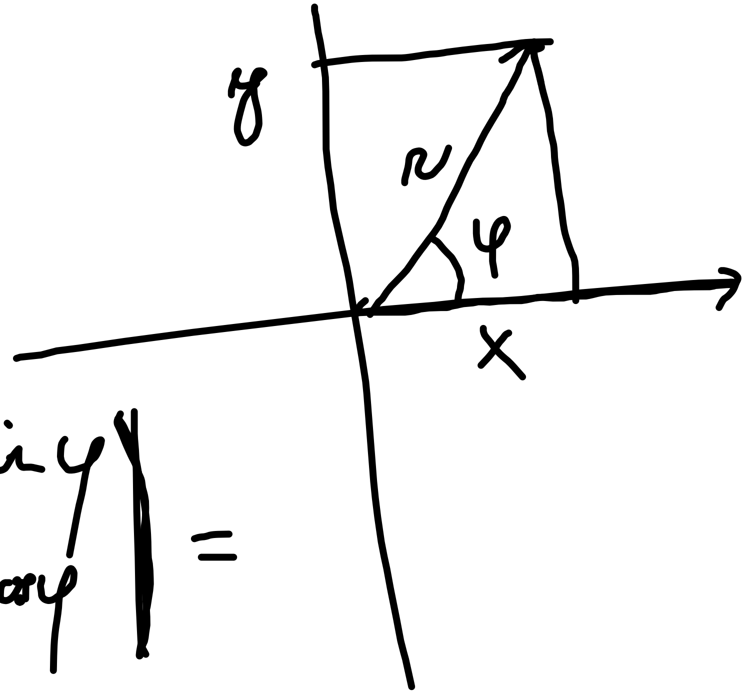
$$x \in \langle u(a), u(b) \rangle \iff t \in \langle a, b \rangle$$

$$dx = \boxed{\frac{du}{dt}}\, dt$$

Znovu příklad s kružnicí:

Uvažme polární souřadnice, tj. zobrazení

$$G : \underset{r}{\mathbb{R}} \times \underset{\varphi}{(0, 2\pi)} \to \mathbb{R}^2$$

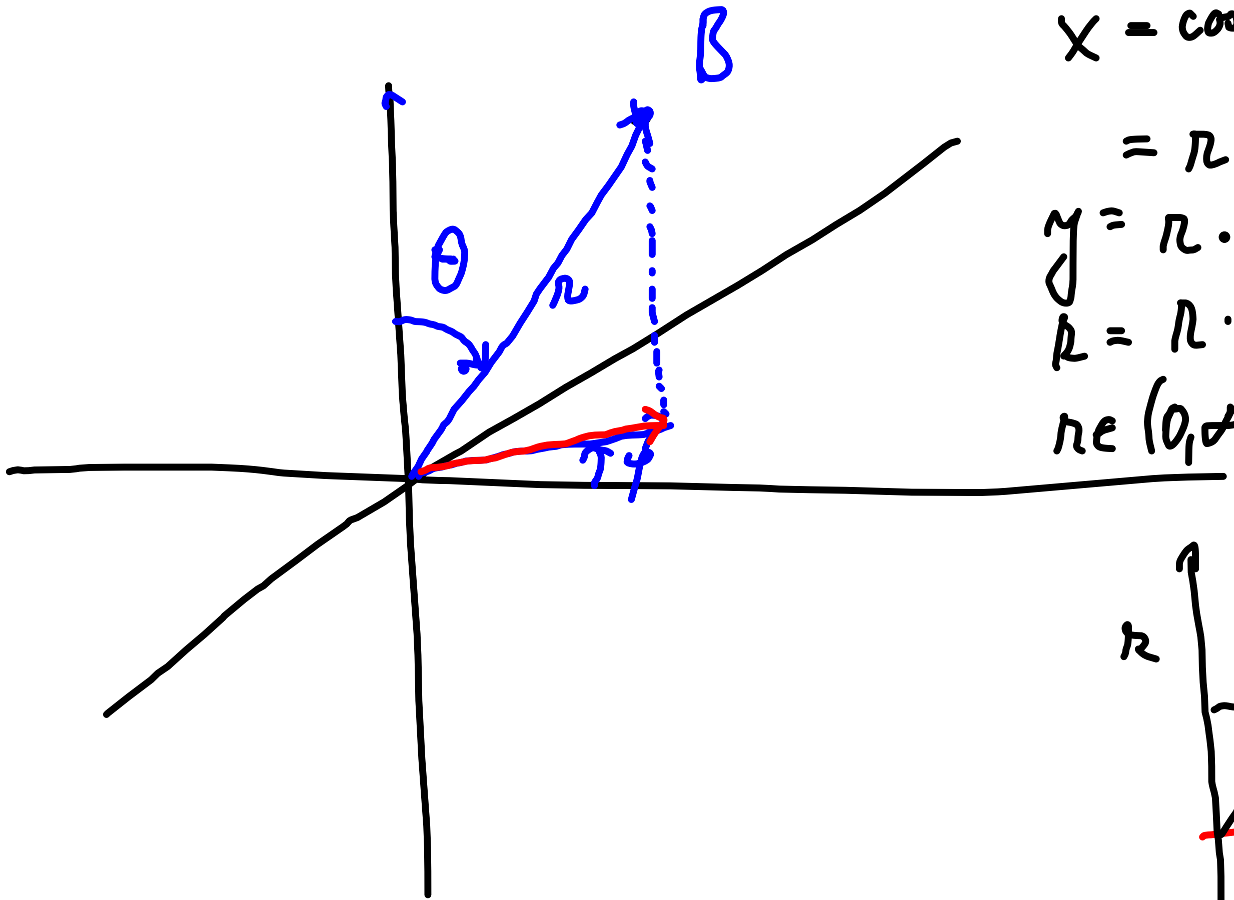


$$x = r\cos\varphi$$
$$y = r\sin\varphi$$

$$J^1 G = \begin{pmatrix} \cos\varphi & -r\sin\varphi \\ \sin\varphi & r\cos\varphi \end{pmatrix} =$$

$$|J^1 G| = r\cos^2\varphi + r\sin^2\varphi = r$$

Sférické souřadnice v $\mathbb{R}^3$



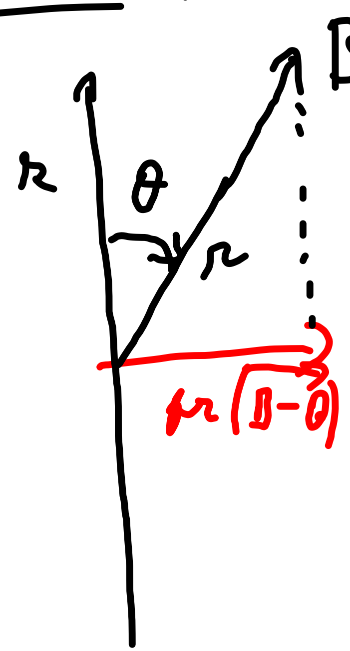
$x = \cos\varphi \cdot \| pr_{xy} \overrightarrow{(B-O)} \| =$

$= r \cdot \cos\varphi \cdot \sin\theta$

$y = r \cdot \sin\varphi \sin\theta$

$z = r \cdot \cos\theta$

$r \in (0, \infty)$, $\varphi \in \langle 0, 2\pi)$, $\theta \in \langle 0, \pi)$



$$D^1 G = \begin{pmatrix} \cos\varphi \sin\theta & -r\sin\varphi\sin\theta & r\cos\varphi\cos\theta \\ \sin\varphi\sin\theta & r\cos\varphi\sin\theta & r\sin\varphi\cos\theta \\ \cos\theta & 0 & -r\sin\theta \end{pmatrix}$$

$$|D^1 G| = r^2 \sin\theta$$

Objem koule o poloměru R

$$\int_0^R \int_0^\pi \int_0^{2\pi} r^2 \sin\theta \, d\theta \, d\varphi \, dr = \ldots = \frac{4}{3}\pi R^3$$