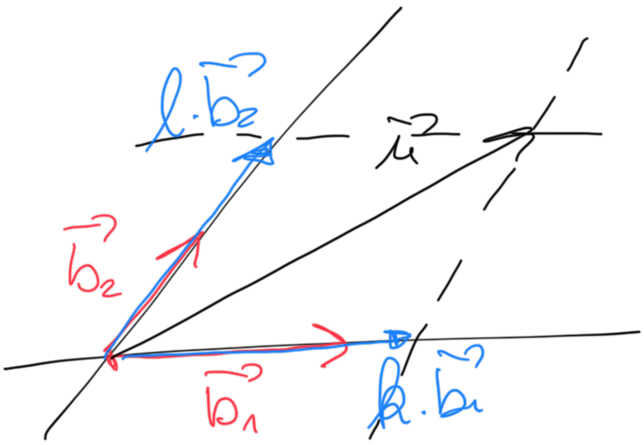
7UM2, 13.5.2021

souřadnice vektoru

- vzhledem k dané bázi B



$B=\{\vec{b_1},\vec{b_2}\}$

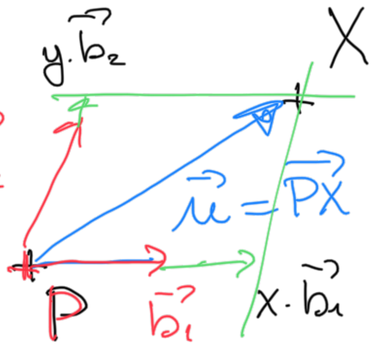
$$\vec{u}=\underbrace{\boxed{k}\cdot\vec{b_1}+\boxed{l}\cdot\vec{b_2}}_{\text{lineární kombinace}}$$

$$\vec{u}=(k,l)_B$$

$$\boxed{\vec{u}=(k,l)}$$

souřadnice vektoru vzhledem k bázi B.

souřadnice bodu



$$\vec{u}=x\cdot\vec{b_1}+y\cdot\vec{b_2}$$

$$\vec{u}=(x,y)_B$$

souřadnice bodu X:

$$\underbrace{\boxed{B=\{\vec{b_1},\vec{b_2}\}+P}} \rightarrow X[x,y]$$

$\mathcal{O}=\{P;\vec{b_1},\vec{b_2}\}$ ... afinní soustava souřadnic (reper)

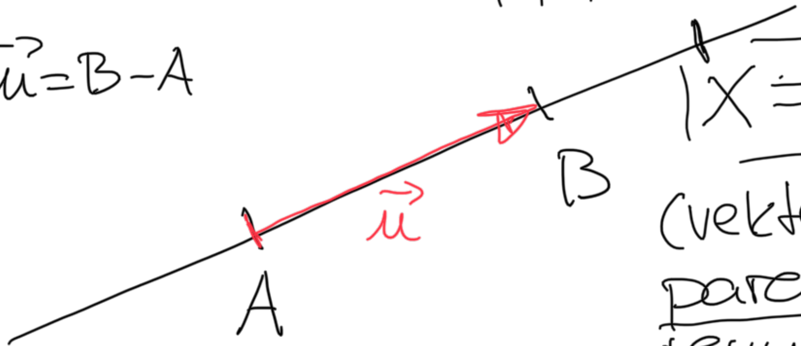
Kartézská soustava souřadnic

$\vec{b_1}, \vec{b_2}$ jsou jednotkové a na sebe kolmé, tj. jsou ortonormální

René Descartes

Parametrické rovnice přímky

$\vec{u} = B - A$



$$\boxed{X = A + s\cdot\vec{u};\ s \in R}$$

(vektorová) parametrická rovnice přímky

$A[a_1, a_2]$, $B[b_1, b_2]$, $X[x, y]$

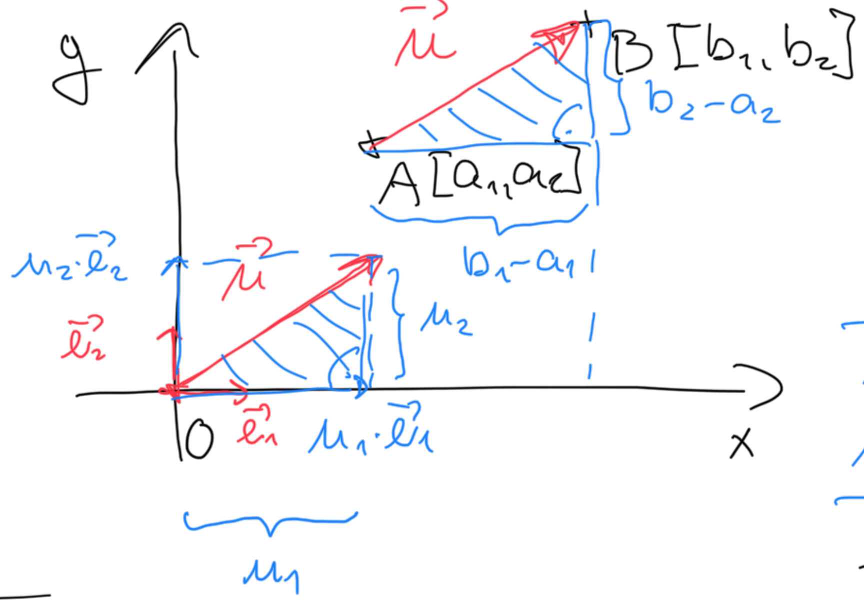
$\vec{u} = (u_1, u_2)$

$$[x, y] = [a_1, a_2] + s\cdot(u_1, u_2);\ s \in R$$

$$[x, y] = [a_1 + s u_1,\ a_2 + s\cdot u_2]$$

$$\left.\begin{aligned} x &= a_1 + s\cdot u_1 \\ y &= a_2 + s\cdot u_2;\ s \in R \end{aligned}\right\}$$ parametrické rovnice přímky

Souvislost mezi souřadnicemi vektoru $\vec{u}$ a souř. bodů A, B.



$\vec{u} = \vec{AB}$

$\vec{u} = (u_1, u_2)$

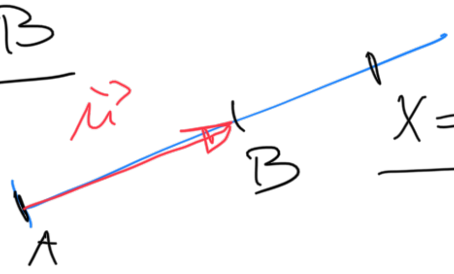
$u_1 = b_1 - a_1$

$u_2 = b_2 - a_2$

$$\boxed{\vec{u} = (u_1, u_2) = (b_1 - a_1, b_2 - a_2) = B - A}$$

$$\boxed{\vec{u} = B - A}$$

Polopřímka $\vec{AB}$

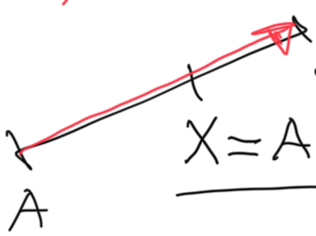


$X = A + t \cdot \vec{u}$; $t \in \langle 0, +\infty)$

$$\vec{AB}: \begin{aligned} x &= a_1 + t \cdot u_1 \\ y &= a_2 + t \cdot u_2; \quad t \in \langle 0, +\infty) \end{aligned}$$

Úsečka AB

$\vec{u} = B - A$



$X = A + t \cdot \vec{u}$; $t \in \langle 0; 1 \rangle$

V prostoru dimenze 3

$A[a_1, a_2, a_3]$, $B[b_1, b_2, b_3]$, $X[x, y, z]$

$\vec{u} = (u_1, u_2, u_3)$

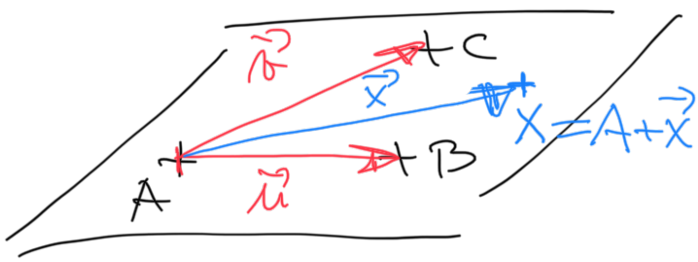
$$\boxed{X = A + s \cdot \vec{u} \,;\; s \in R}$$

$$\left.\begin{aligned} x &= a_1 + s \cdot u_1 \\ y &= a_2 + s \cdot u_2 \\ z &= a_3 + s \cdot u_3 \,;\; s \in R \end{aligned}\right.$$

3 rovnice

Parametrické rovnice roviny

(v prostoru dimenze 3)



A, B, C nemohou ležet v přímce

musí být nezávislé

$$X = A + \vec{x} = A + \underbrace{r \cdot \vec{u} + s \cdot \vec{v}}_{\vec{x}}$$

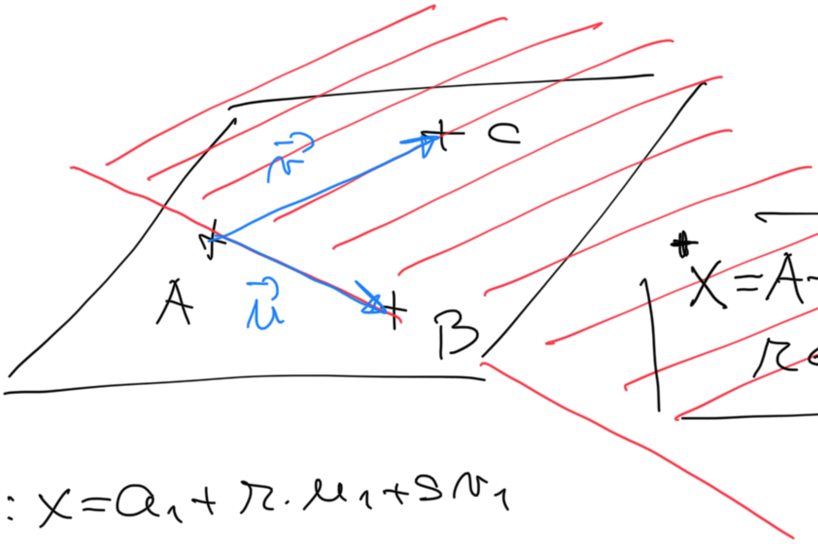
(vektorová) parametrická rovnice roviny

$$\boxed{X = A + r \cdot \vec{u} + s\vec{v} \,;\; r, s \in R}$$

$$\left.\begin{aligned} x &= a_1 + r \cdot u_1 + s v_1 \\ y &= a_2 + r \cdot u_2 + s v_2 \\ z &= a_3 + r \cdot u_3 + s v_3 \,;\; r, s \in R \end{aligned}\right\}$$

parametrické rovnice roviny

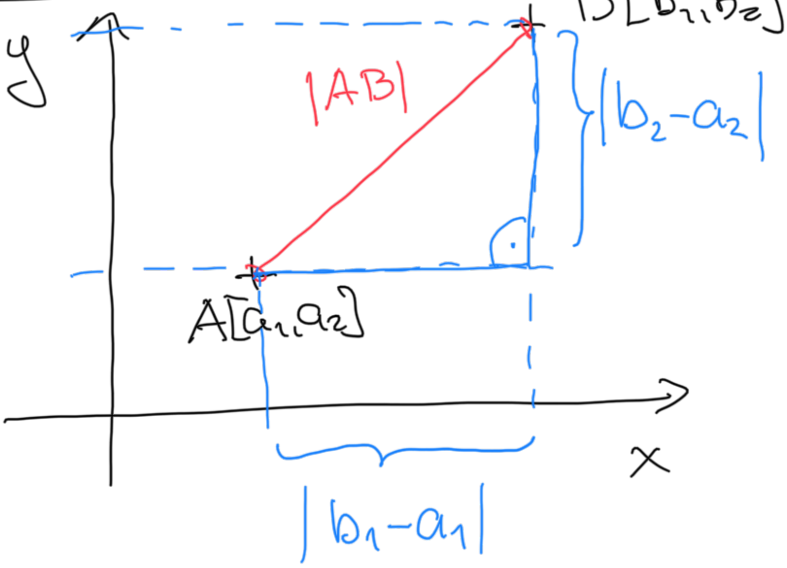
Polorovina $\overrightarrow{ABC}$

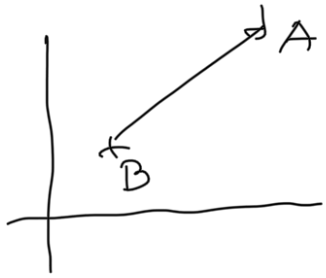


$$X = A + r\cdot\vec{u} + s\cdot\vec{v}\,;\quad r\in R,\ s\in\langle 0;+\infty)$$

$$\overrightarrow{ABC}:\ \begin{aligned} x &= a_1 + r\cdot u_1 + s v_1 \\ y &= a_2 + r\cdot u_2 + s v_2 \\ z &= a_3 + r\cdot u_3 + s v_3\,;\quad r\in R,\ s\in\langle 0,+\infty) \end{aligned}$$

Vzdálenost bodů





$$|AB|^2 = |b_1-a_1|^2 + |b_2-a_2|^2$$

$$|AB|^2 = (b_1-a_1)^2 + (b_2-a_2)^2$$

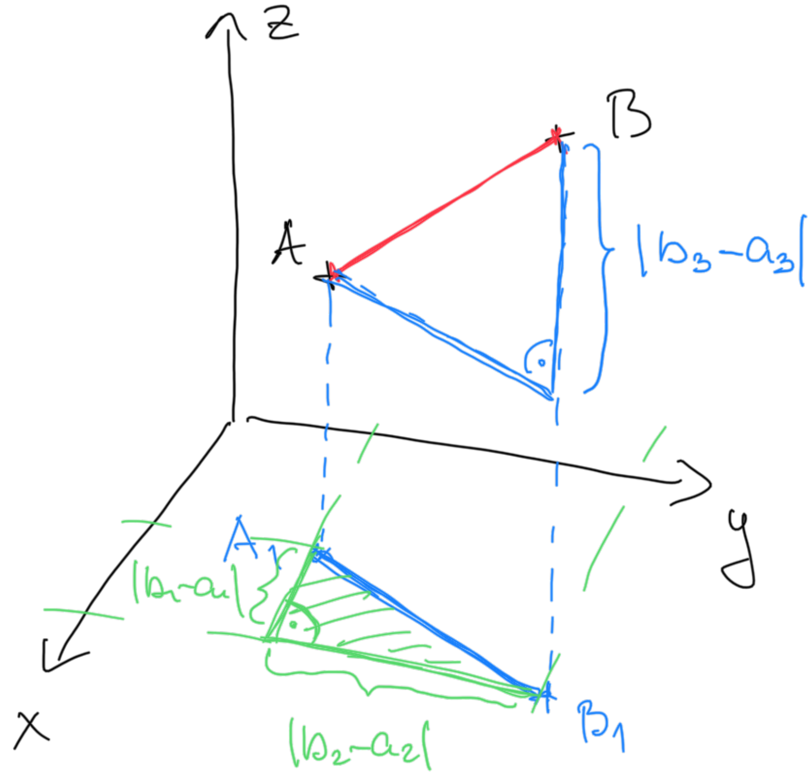
$$|x|^2 = x^2$$

vzdálenost

$$\boxed{|AB| = \sqrt{(b_1-a_1)^2+(b_2-a_2)^2}}$$

bodů A, B (délka úsečky AB)

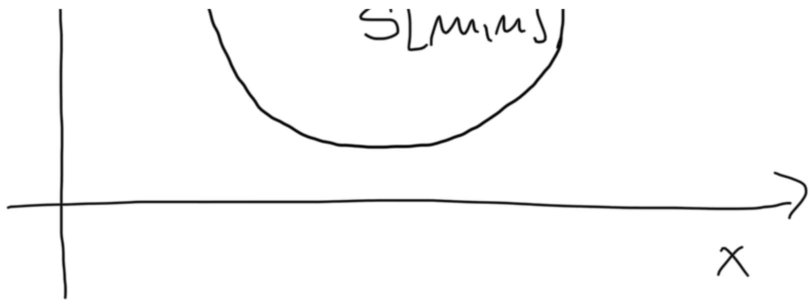
<u>V prostoru</u>



$$\left.\begin{aligned} |A_1B_1| &= \sqrt{(b_1-a_1)^2+(b_2-a_2)^2} \\ |AB| &= \sqrt{|A_1B_1|^2+(b_3-a_3)^2} \end{aligned}\right\}$$

$$\boxed{|AB| = \sqrt{(b_1-a_1)^2+(b_2-a_2)^2+(b_3-a_3)^2}}$$

<u>Kružnice</u> $k(S, r)$

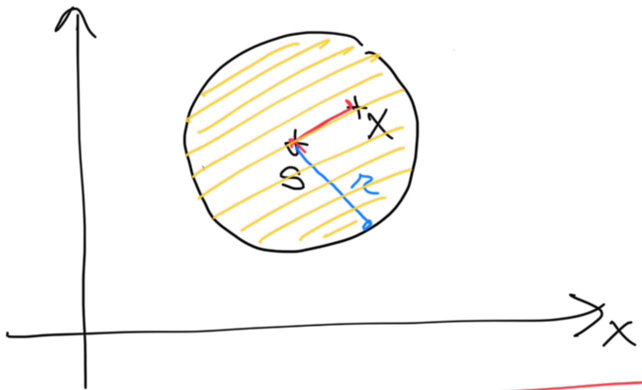


$k = \{X;\ |SX| = r\}$

$|SX| = r \longrightarrow \sqrt{(x-m)^2+(y-n)^2} = r \quad /^2$

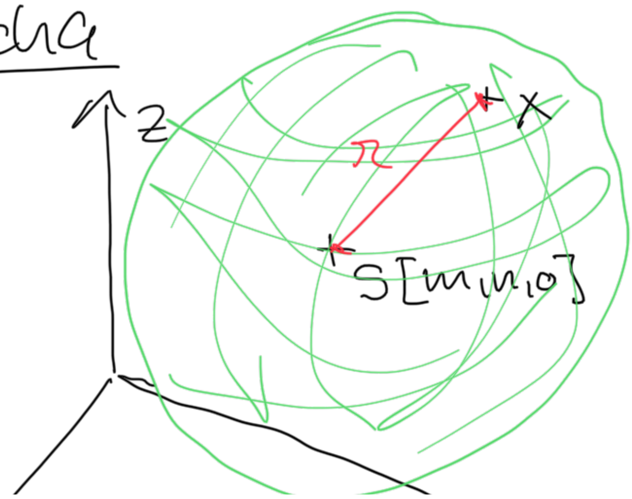
$\boxed{k: (x-m)^2+(y-n)^2 = r^2}$

Kruh $K(S,r)$



$\boxed{K: (x-m)^2+(y-m)^2 \leq r^2}$

Kulová plocha

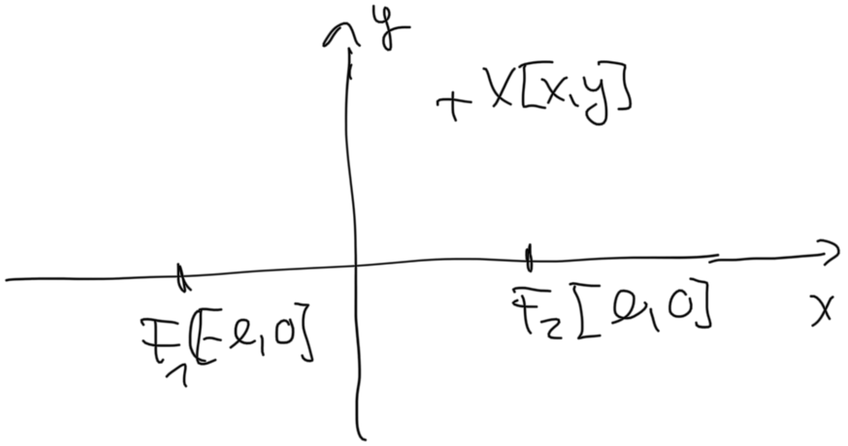


$$|SX| = r \to \boxed{(x-m)^2+(y-n)^2+(z-o)^2 = r^2}$$

Koule: —— " —— $\le r^2$

GeoGebra $\quad S \to x(S),\ y(S),\ z(S)$

Rovnice elipsy



$$|F_1X| + |F_2X| = 2a$$

$$\frac{|F_1X|}{|F_2X|} = k \quad , \text{ např. } k=2 \ (\text{Příklad 1})$$