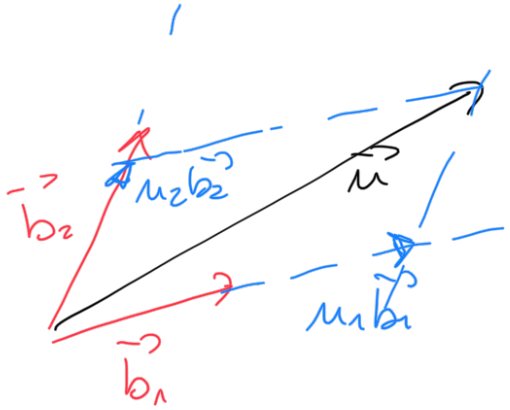
7UM2, Čt. 11.5. 2021

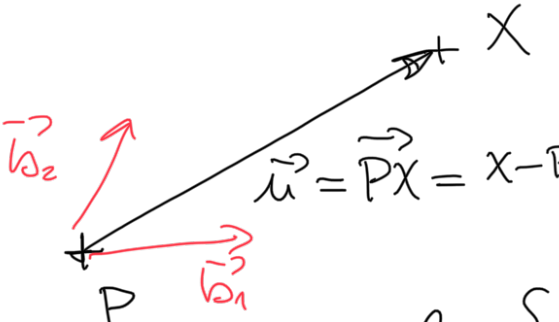
souřadnice vektoru (vzhledem k dané bázi $B = \{\vec{b}_1, \vec{b}_2\}$)



$$\vec{u} = u_1 \cdot \vec{b}_1 + u_2 \cdot \vec{b}_2$$

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

souřadnice bodu



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

$X[u_1, u_2]$

$\varphi = \{P, \vec{b}_1, \vec{b}_2\}$ repér

afinní soustava souřadnic

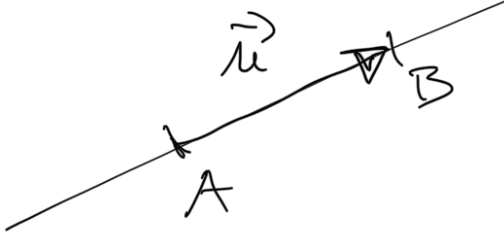
kartézská soustava souřadnic

$\vec{b}_1, \vec{b}_2$ jsou jednotkové a jsou na sebe kolmé

V prostoru dimenze 3 je to analogicky, akorát přibyde 3. souřadnice

Parametrická rovnice priamky

priamky



$$X = A + t \cdot \vec{u}$$

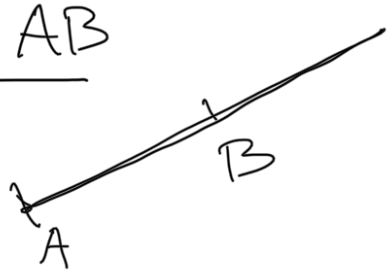
v rovine: $A[a_1, a_2]$, $B[b_1, b_2]$, $X[x, y]$

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

parametrické rovnice priamky

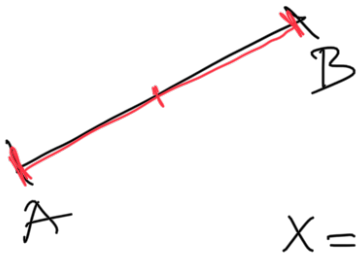
$$\left.\begin{aligned} x &= a_1 + t \cdot u_1 \\ y &= a_2 + t \cdot u_2 \end{aligned}\right\}; \quad t \in R$$

polopriamka $\overrightarrow{AB}$



$$\left.\begin{aligned} x &= a_1 + t \cdot u_1 \\ y &= a_2 + t \cdot u_2 \end{aligned}\right\}; \quad t \in \langle 0; +\infty)$$

úsečka AB



$$\vec{u} = \overrightarrow{AB} = (B - A)$$

$$\left.\begin{aligned} x &= a_1 + t \cdot u_1 \\ y &= a_2 + t \cdot u_2 \end{aligned}\right\}; \quad t \in \langle 0; 1 \rangle$$

v priestore: $A[a_1, a_2, a_3]$, $B[b_1, b_2, b_3]$

$X[x, y, z]$

$$\vec{u} = \overrightarrow{AB} = (u_1, u_2, u_3) = (b_1 - a_1; b_2 - a_2; b_3 - a_3)$$

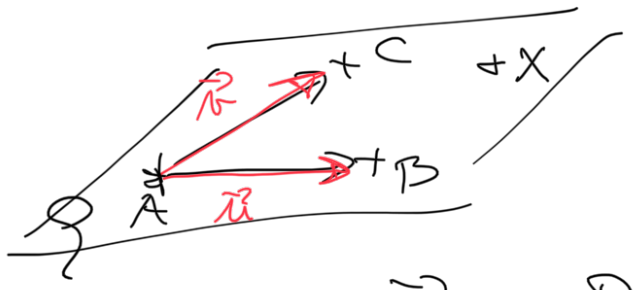
parametrické rovnice $x = a_1 + t \cdot u_1$

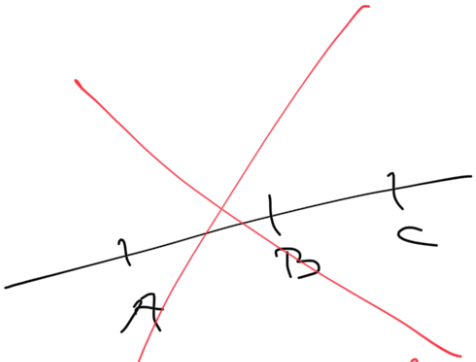
$y = a_2 + t \cdot u_2$

$z = a_3 + t \cdot u_3 ; \; t \in R$

Parametrické rovnice roviny

v prostoru dimenze 3





nekonečně bodů kolineární

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

parametrické rovnice

$A[a_1, a_2, a_3], \; \vec{u} = (u_1, u_2, u_3) = B - A$

$\vec{v} = (v_1, v_2, v_3) = C - A$

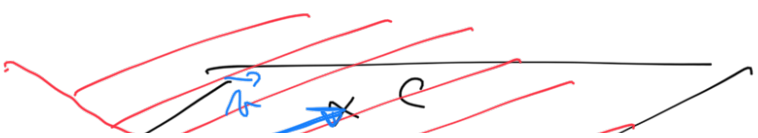
$X[x, y, z]$

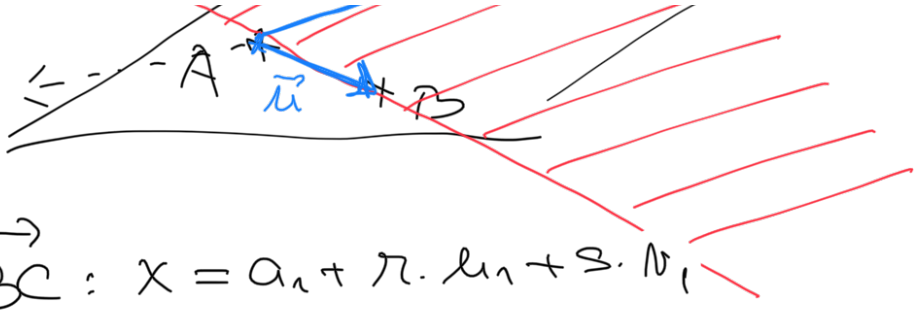
$\varrho: \; x = a_1 + r \cdot u_1 + s v_1$

$y = a_2 + r \cdot u_2 + s \cdot v_2$

$z = a_3 + r \cdot u_3 + s \cdot v_3 \; ; \; r, s \in R$

par. rovnice polopřímky





$\overleftrightarrow{ABC}$: $x = a_1 + r \cdot u_1 + s \cdot v_1$

$y = a_2 + r \cdot u_2 + s \cdot v_2$

$z = a_3 + r \cdot u_3 + s \cdot v_3$; $r \in R$, $s \in \langle 0, +\infty)$

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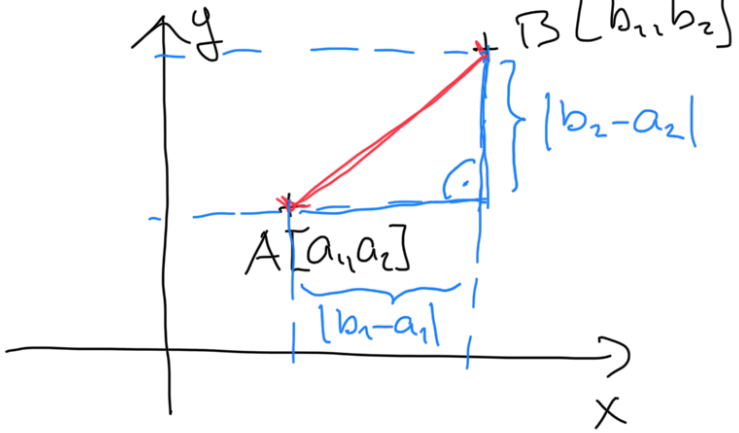
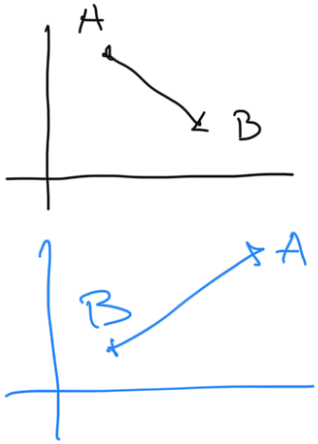
vzdálenost bodů





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

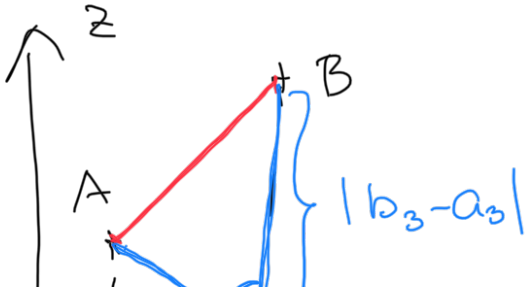
$|AB|^2 = (b_1 - a_1)^2 + (b_2 - a_2)^2$

$|x|^2 = x^2$

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

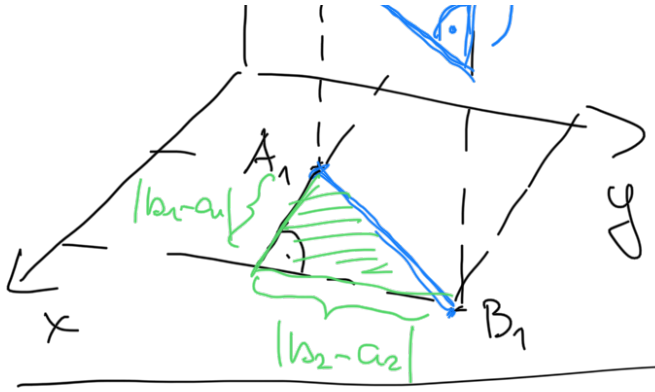
vzdálenost bodů A, B ; (délka úsečky AB)

v prostoru dimenze 3



$A[a_1, a_2, a_3]$

$B[b_1, b_2, b_3]$

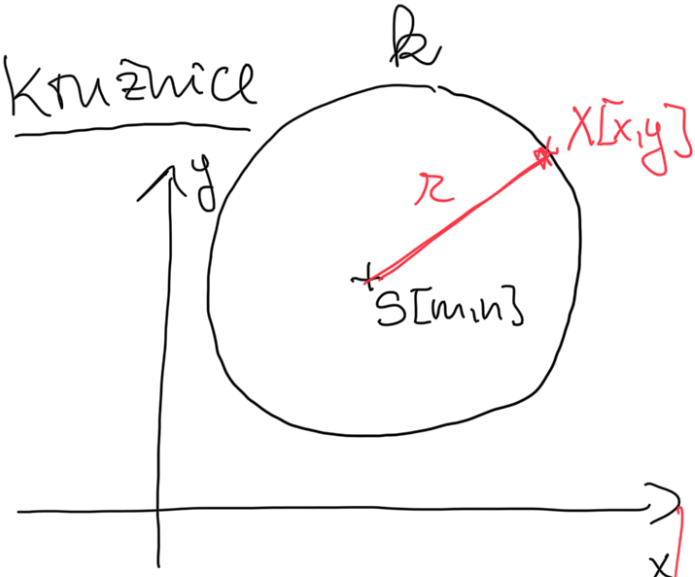


$$|A_1B_1| = \sqrt{(b_1-a_1)^2+(b_2-a_2)^2}$$

$$|AB| = \sqrt{|A_1B_1|^2+(b_3-a_3)^2}$$

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

Kružnice



$k(S, r)$

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

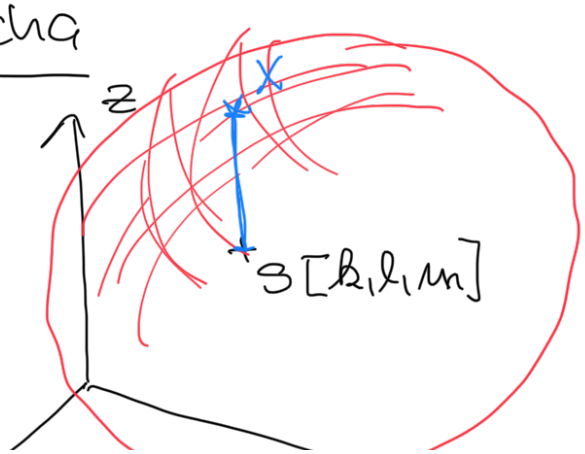
$$|SX| = \sqrt{(x-m)^2+(y-n)^2} = r$$

$$k: (x-m)^2+(y-n)^2 = r^2$$

Kruh

$$K: (x-m)^2+(y-n)^2 \leq r^2$$

Kulová plocha



$$|SX| = r$$

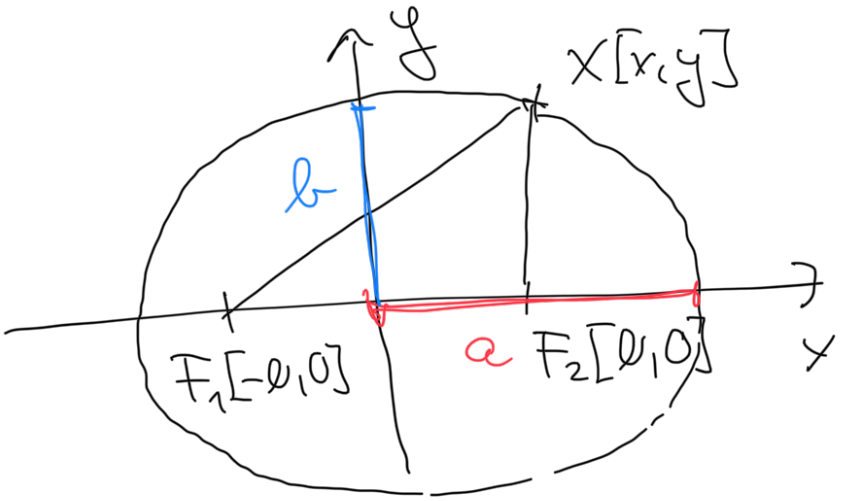
$$\sqrt{(x-k)^2+(y-l)^2+(z-m)^2} = r \quad /^2$$

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

Geo Gebra: $S \rightarrow x(S), y(S), z(S)$

$$(x-x(S))^2+(y-y(S))^2+(z-z(S))^2 = r^2$$

Równanie elipsy



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

$$\sqrt{(x+e)^2+y^2} + \sqrt{(x-e)^2+y^2} = 2a \quad /^2$$

$$(x+e)^2+y^2+(x-e)^2+y^2+2\sqrt{\quad}\sqrt{\quad} = 4a^2$$

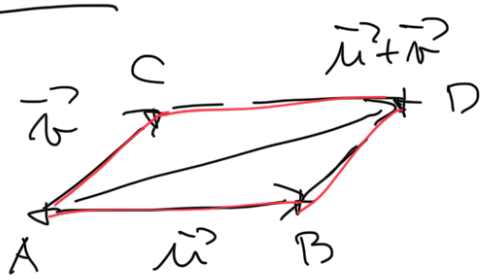
$$2\sqrt{\quad}\sqrt{\quad} = 4a^2 - 2x^2 - 2y^2 - 2e^2$$

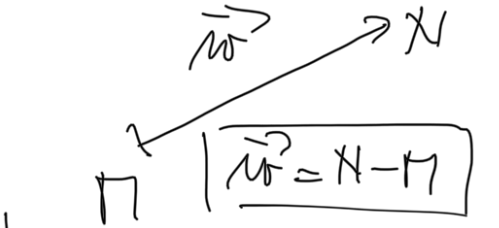
D.Ú. dopočítat

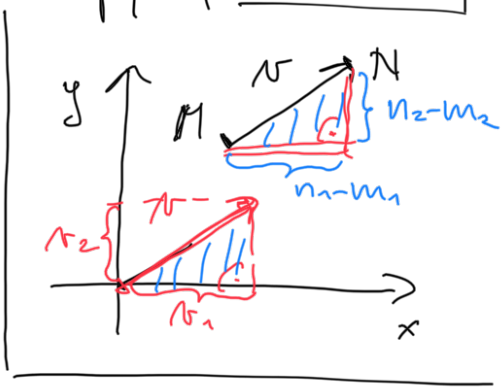
ÚKOL:

$$\frac{|XA|}{|XB|} = 2$$

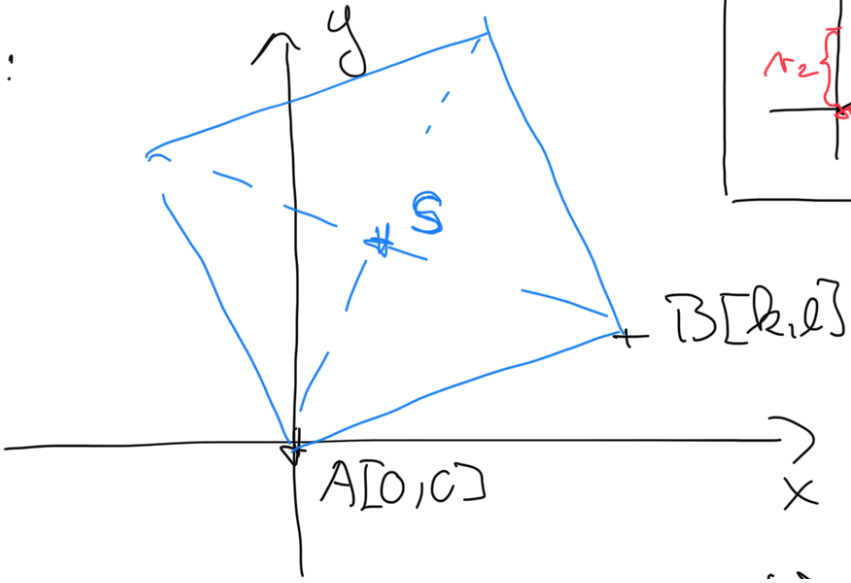
Součet vektorů





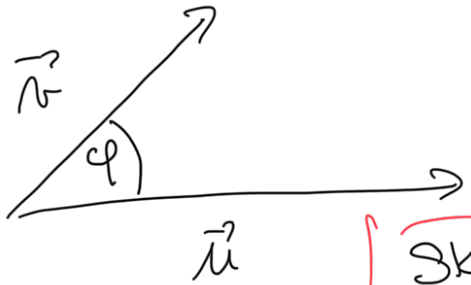


ÚKOL:



vyjádřete souřadnice středu S úsečky pomocí souřadnic bodů A, B.

Odchylka dvou vektorů



$$\cos\varphi = \frac{\vec{u}\cdot\vec{v}}{|\vec{u}|\cdot|\vec{v}|}$$

$\vec{u} = (u_1, u_2)$
$\vec{v} = (v_1, v_2)$

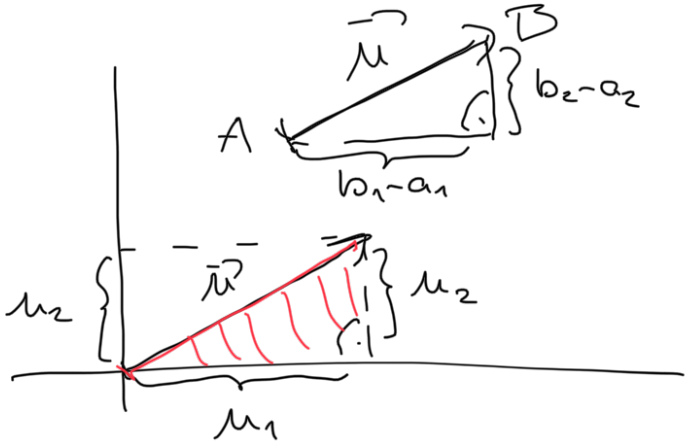
SKALÁRNÍ SOUČIN

$$\vec{u}\cdot\vec{v} = u_1 v_1 + u_2 v_2$$

$\cdot$ ... symbol skalárního součinu

velikost vektoru (norma) $|\vec{u}|$

= délka libovolné orient. úsečky, která je jeho umístěním



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

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

$u_1 = b_1 - a_1$

$u_2 = b_2 - a_2$

$\vec{u} = B - A$

$$|\vec{u}| = \sqrt{u_1^2 + u_2^2}$$

odchylka dvou přímek