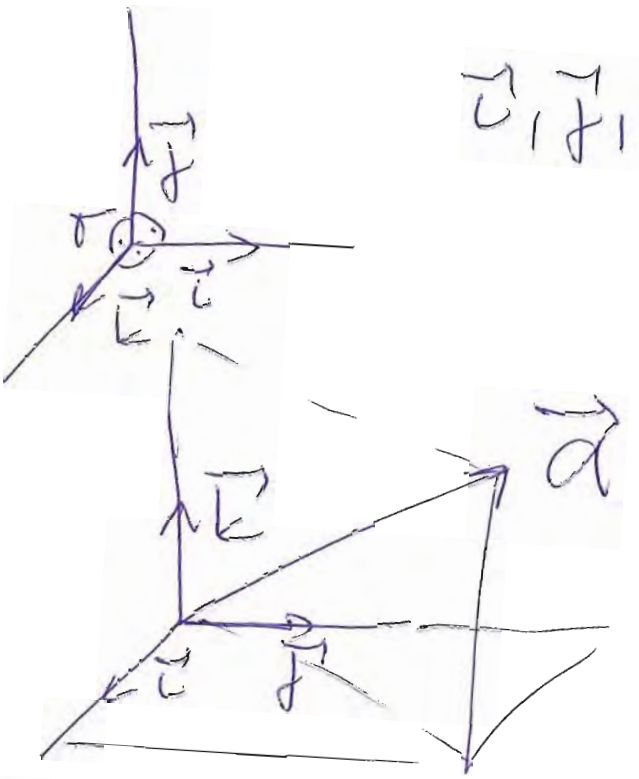
15.9. 8:00

Počítání s vektory

$$\vec{a} = (a_x, a_y, a_z)$$



velikost vektoru

$$|\vec{a}| = a = \sqrt{a_x^2 + a_y^2 + a_z^2}$$

počítání s vektory

- sčítání, odčítání $\vec{a} + \vec{b}$
- násobení
  - skalárem $\lambda \vec{a} = \vec{b}$
  - skalární součin $\vec{a} \cdot \vec{b} = \lambda$
  - vektorový součin $\vec{a} \times \vec{b} = \vec{c}$

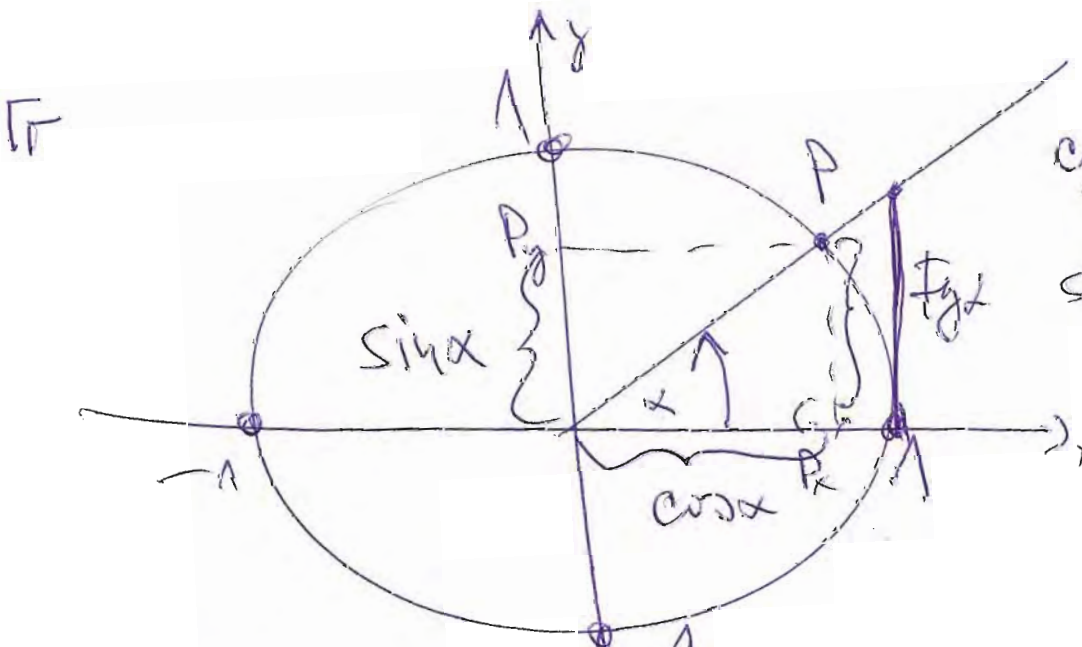
Složky vektoru

Skalární součin

$$\vec{a} \cdot \vec{b} = a_x b_x + a_y b_y + a_z b_z = |\vec{a}||\vec{b}|\cos\alpha$$

pro R²

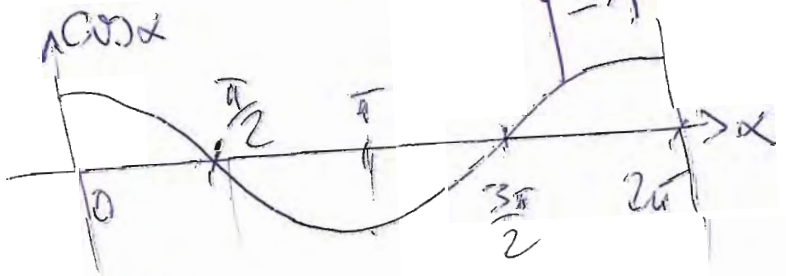
$\vec{i} \cdot \vec{j} = 0$ a obdobně ($\vec{i} \to \vec{x}$; $\vec{j} \to \vec{y}$; $\vec{k} \to \vec{z}$)

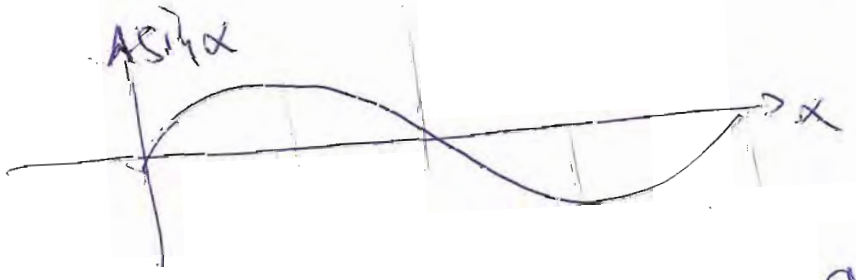


$\cos\alpha = \frac{\text{přilehlé}}{\text{přepona}}$

$\sin\alpha = \frac{\text{protější}}{\text{přep}}$

$tg\,\alpha = \frac{\sin\alpha}{\cos\alpha}$





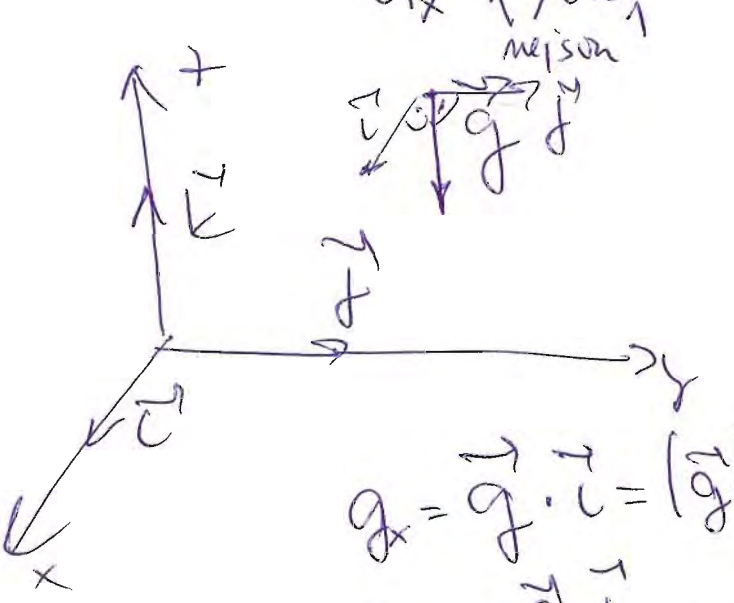
$k=$	0	1	2	3	4
	0°	30°	45°	60°	90°
$\sin\alpha$	$\frac{\sqrt{0}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$
	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos\alpha$:	90°	60°	45°	30°	0°

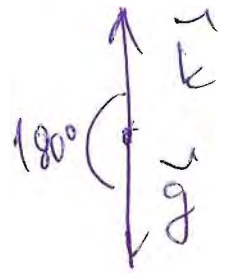
Słotty: $\vec{a} = a_x\vec{i} + a_y\vec{j} + a_z\vec{k}$

$$\vec{a}\cdot\vec{i} = (a_x\vec{i} + a_y\vec{j} + a_z\vec{k})\cdot\vec{i} =$$

$$= a_x\vec{i}\cdot\vec{i} + a_y\vec{i}\cdot\vec{j} + a_z\vec{i}\cdot\vec{k} =$$

$$= a_x \cdot 1 \cdot 1 \cdot \cos 0^\circ$$





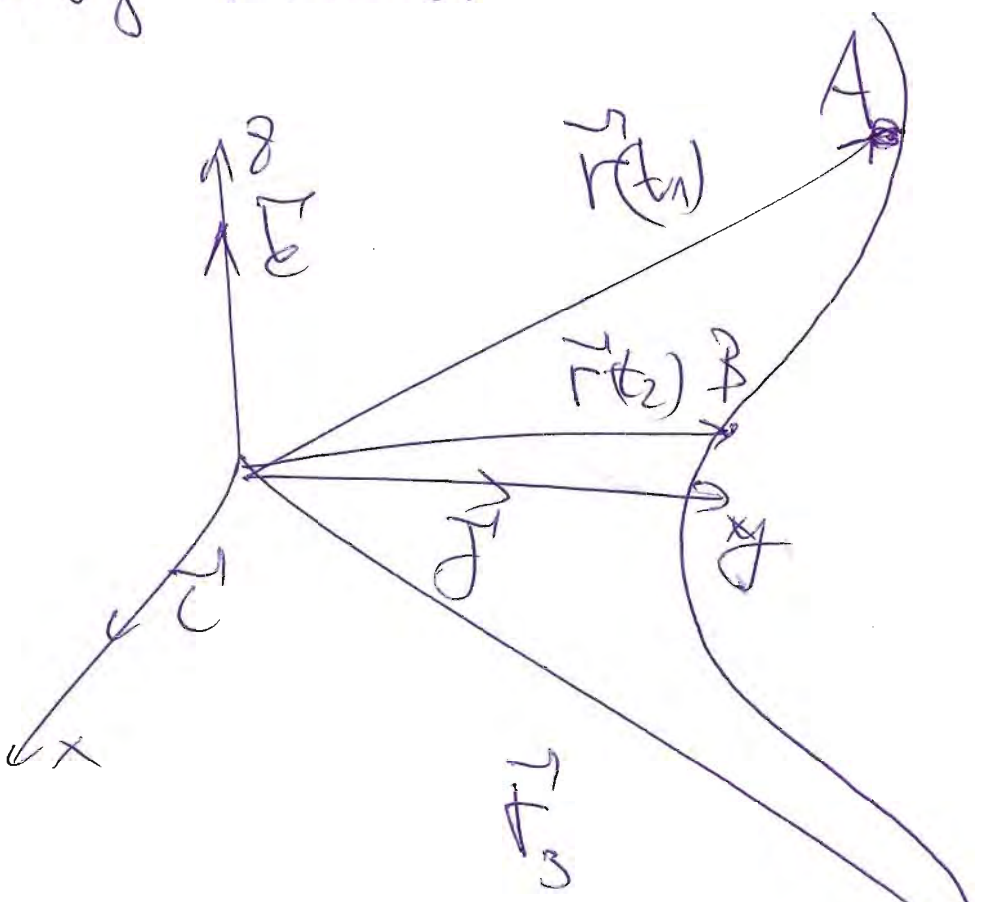
$$g_x = \vec{g}\cdot\vec{i} = |\vec{g}|\,|\vec{i}|\cos 90^\circ = 0$$

$$g_y = \vec{g}\cdot\vec{j} = 0$$

$$g_z = |\vec{g}|\,|\vec{k}|\cos 180^\circ = -g$$

$$\vec{g} = (0, 0, -g)$$

Polohový vektor



$$\vec{r}(t) = (x(t), y(t), z(t)) \quad C$$

Př.:

$$y(t) = 4 + \frac{1}{2}t \quad (m)$$

(m/s, s)

$$y(t) = 0{,}5 \sin \omega t \quad (m)$$

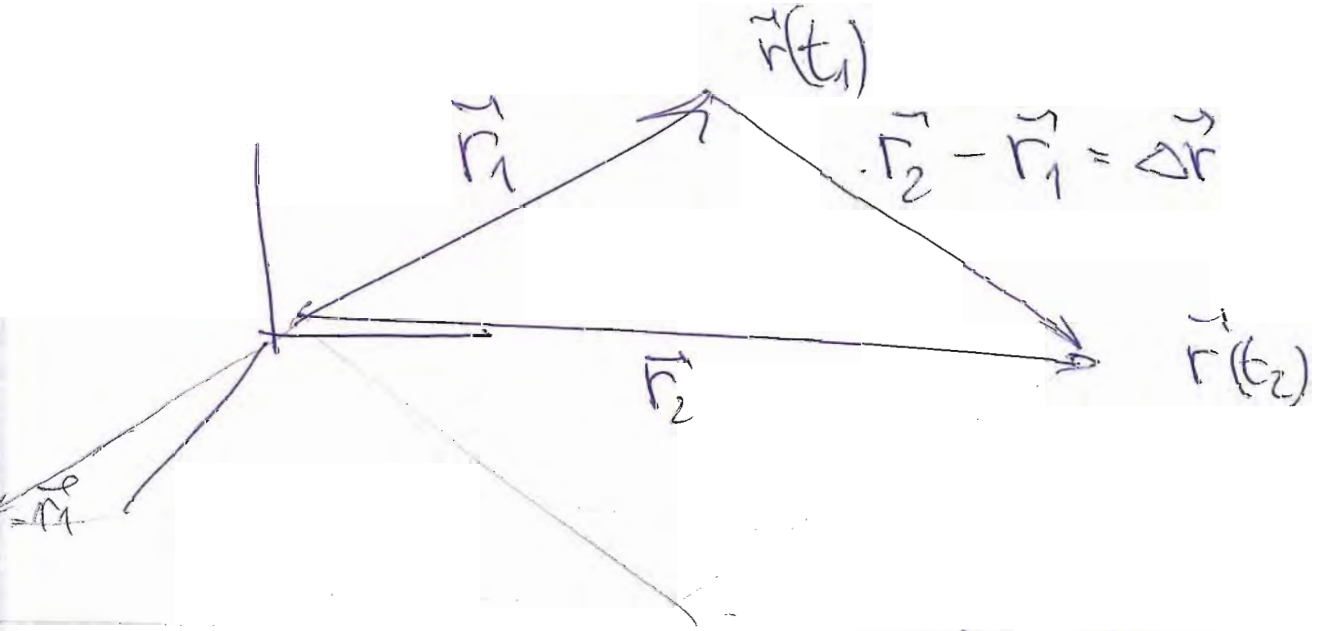
$$z(t) = \left(4 - \frac{1}{2} g t^2\right) \quad (m), \quad (m s^{-2}, s^2)$$

$2\pi\,rad = 360°$

rychlost

$\vec{v}$

průměrná rychlost $\vec{v}_{pr}(\Delta t)$



$$\vec{v}_{Pr}(\Delta t) = \frac{\Delta \vec{r}}{\Delta t} = \frac{\vec{r}(t+\Delta t) - \vec{r}(t)}{\Delta t}$$

okamžitá rychlost

$$\vec{v}(t) = \lim_{\Delta t \to 0} \vec{v}_P(\Delta t) = \lim_{\Delta t \to 0} \frac{\vec{r}(t+\Delta t) - \vec{r}(t)}{\Delta t}$$