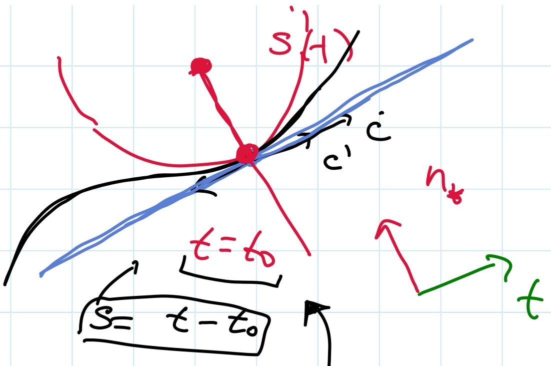
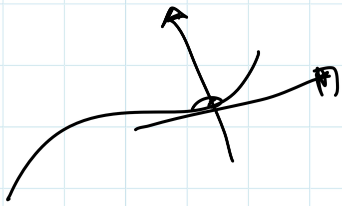
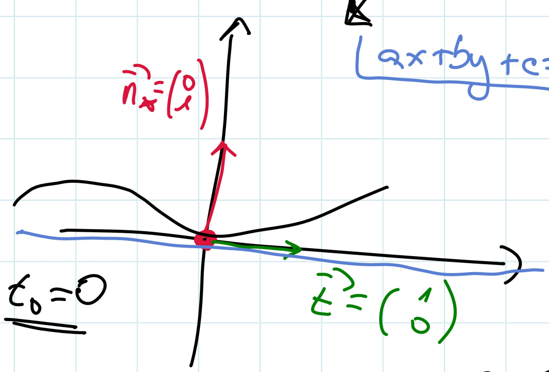


$c(t) + \langle c'(t) \rangle$



1.11 DK

$Ax + \vec{a}$



$ax + by + c = 0$

stačí dokázat: pro

$$c(0) = \binom{0}{0} \qquad c'(0) = \binom{c_x'(0)}{0} \qquad c_x(0) > 0$$

$$k_z = \frac{\det(c_x', c_x'')}{\|c_x'\|^3} = \frac{\begin{vmatrix} c_x' & c_x'' \\ 0 & c_y'' \end{vmatrix}}{(c_x')^3} = \boxed{\frac{c_y''}{(c_x')^2}}$$

$$\mathbf{c}(t) = \Big(\overbrace{c_x'(0)t + \frac{1}{2}c_x''(0)t^2 + o(t^2)}^{c_x(t)}, \overbrace{\frac{1}{2}c_y''(0)t^2 + o(t^2)}^{c_y(t)}\Big)$$

$$ax + by + c = 0$$

$$a\left(c_x' \cdot t + \frac{1}{2} c_x'' t^2\right) + b\left(\frac{1}{2} c_y'' t^2\right) + c + o(t^2) = 0$$

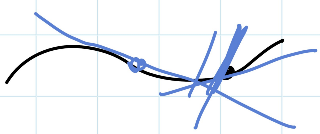
$$c + t(a\, c_x') + t^2\left(\frac{1}{2} a c_x'' + \frac{1}{2} b c_y''\right) + o(t^2) = 0$$

$c \overset{?}{=} 0 \Leftrightarrow \underline{c = 0}$ $\quad$ $a c_x' = 0 \Leftrightarrow \underline{a = 0}$ $\Rightarrow$ $b \neq 0$ např. $b = 1$ $\quad$ $\underline{y = 0}$ $\quad$ $\frac{1}{2} c_y'' = 0 \Leftrightarrow k_z = 0.$

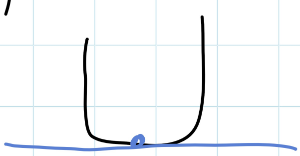
1 násobný průsečík

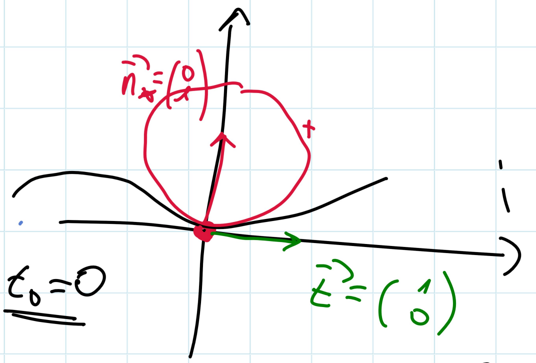
2 násobný průsečík

3 násob. průsečík



(t, t^4)





stačí dokázat: pro

$$c(0) = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$c'(0) = \begin{pmatrix} c_x'(0) \\ 0 \end{pmatrix}$$

$c_x'(0) > 0$

$$\left[k_z = \frac{\det(c_x', c_x'')}{\|c_x'\|^3} = \frac{\begin{vmatrix} c_x' & c_x'' \\ 0 & c_y'' \end{vmatrix}}{(c_x')^3} = \boxed{\frac{c_y''}{(c_x')^2}} \right.$$

$$\mathbf{c}(t) = \Big(\overbrace{c_x'(0)t + \frac{1}{2}c_x''(0)t^2 + o(t^2)}^{c_x(t)}, \overbrace{\frac{1}{2}c_y''(0)t^2 + o(t^2)}^{c_y(t)} \Big)$$

$$(x - S_x)^2 + (y - S_y)^2 - R^2 = 0$$

$$\left(c_x' t + \frac{1}{2} c_x'' t^2 - S_x\right)^2 + \left(\frac{1}{2} c_y'' \cdot t^2 - S_y\right)^2 - R^2 + o(t^2) = 0$$

$$\underbrace{\left(S_x^2 + S_y^2 - R^2\right)}_{=0} + t\left(-\underbrace{2c_x' \cdot S_x}_{0}\right) + t^2\underbrace{\left(c_x'^2 - c_x'' \cdot S_x - c_y'' S_y\right)}_{=0} + o(t^2) = 0$$

$\Updownarrow$

$R = \sqrt{S_x^2 + S_y^2}$ $\Updownarrow$ $\underline{S_x = 0}$ $c_x'^2 - c_y'' \cdot S_y = 0$

1. nás. průsečík 2. nás. průsečík

$$S_y = \frac{c_x'^2}{c_y''} = \underline{\underline{\frac{1}{k_z}}}$$

$$R = S_y$$

3. nás. průsečík

člen u $t^3 = 0 \iff \underline{\underline{k_z' = 0}}$

$\underbrace{1.12.\ \text{Dl.}}$ $\qquad r(t) = \|c'(t)\| \qquad$ idealni $r(t)=1$

$c(t) = (10\cos t,\ 10\sin t) \qquad \kappa_z = \frac{1}{10}$

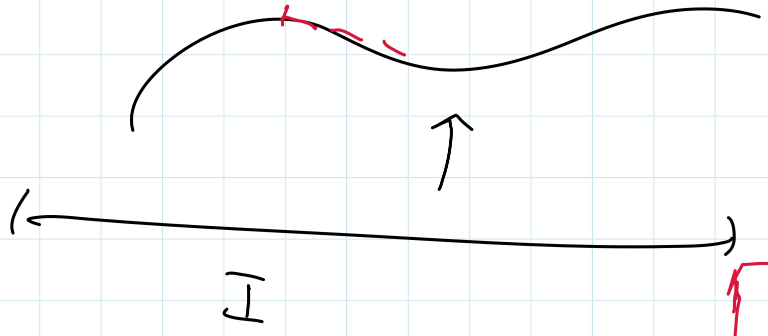
$c'(t) = 10(-\sin t,\ \cos t) \qquad \|c'(t)\| = 10$

$s = 10t \qquad t = \frac{s}{10}$

$c(s) = \left(10\cos\frac{s}{10},\ \sin\frac{s}{10}\right)$

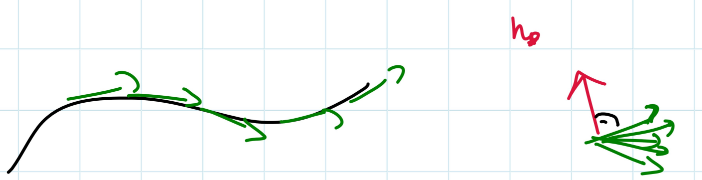
$\dot c(s) = \cancel{10}\left(\frac{1}{\cancel{10}} \cdot -\sin\frac{s}{10},\ \frac{1}{\cancel{10}} \cdot \cos\frac{s}{10}\right) \qquad \|\dot c(s)\| = 1.$

$\|c'\| = 1$



$r \equiv 1$

$$\boxed{\vec t\,' = \kappa_z \cdot \vec n_0}$$

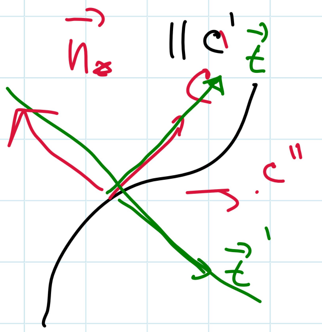


Dk

$$(\vec t)' = \left(\frac{c'}{\|c'\|}\right)' = \frac{\|c'\|\cdot c'' - \frac{1}{2}\,\frac{2\cdot c'\cdot c''}{\sqrt{c'\cdot c'}}\cdot c'}{\|c'\|^2} =$$

$\|c'\| = \sqrt{c'\cdot c'}$ $= \|c'\|'$

$\|c'\|$



$$= \frac{\|c'\|^2\cdot c'' - (c'\cdot c'')\cdot c'}{\|c'\|^3}$$

Trditev a) $\vec t' \perp \vec t$

$$\vec t'\cdot\vec t = \left(\frac{\|c'\|^2\cdot c'' - (c'\cdot c'')\cdot c'}{\|c'\|^3}, \frac{c'}{\|c'\|}\right) =$$

$$= \frac{1}{\|c'\|^4}\left(\|c'\|^2\cdot(c''\cdot c') - (c'\cdot c'')\cdot(c'\cdot c')\right) = 0$$

$\Rightarrow \quad \vec t' = \kappa\,\vec n_*$

b) Spočitajmo κ.

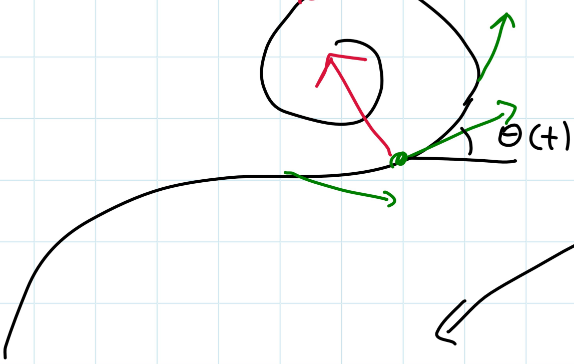
$$\det(\vec t, \vec t') = \det\left(\frac{c'}{\|c'\|}, \frac{\|c'\|^2\cdot c'' - \overbrace{(c'\cdot c'')\cdot c'}^{=0}}{\|c'\|^3}\right) =$$

$$= \frac{1}{\|c'\|^4}\det(c', \|c'\|^2\cdot c'') = \frac{1}{\|c'\|^2}\det(c', c'') = \|c'\|\cdot \kappa_z$$

$$\det(\vec t, \vec t') = \det(\vec t, \kappa\vec n_*) = \kappa\cdot\det(\vec t, \vec n_*) = |\kappa|$$

ON matrice det := 1

$n_* = (-\sin\theta(t), \cos\theta(t))$



$\vec{\tau}(t) = (\cos\theta(t), \sin\theta(t))$

$$\vec{\tau}\,' = \theta'(t)\underbrace{(-\sin\theta(t), \cos\theta(t))}_{n_*}$$

$$= r \cdot \kappa_z \cdot n_*$$

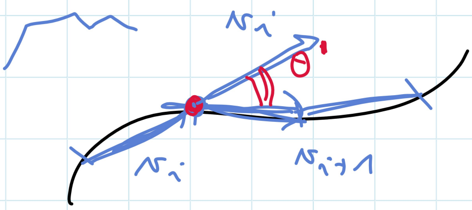
$$\boxed{r \cdot \kappa_z = \theta'}$$

$r = 1$

$\kappa_z = \theta'$

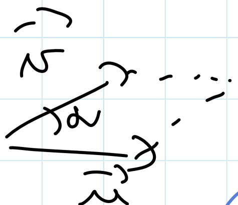
diskrétne verze

$$\kappa_z = \frac{\theta'}{r}$$



$$r \approx \frac{v_i + v_{i+1}}{2}$$

& θ'



$$\det(\vec{u}, \vec{v}) = \pm\|\vec{u}\|\cdot\|\vec{v}\|\sin\alpha$$

$$\theta' = \arcsin\left[\frac{\det(\vec{v}_i, \vec{v}_{i+1})}{\|\vec{v}_i\|\,\|\vec{v}_{i+1}\|}\right]$$

VIZ SLAJDY

VĚTA 1.13

$r(t)^{>0}$ .... $\|c'(t)\|$

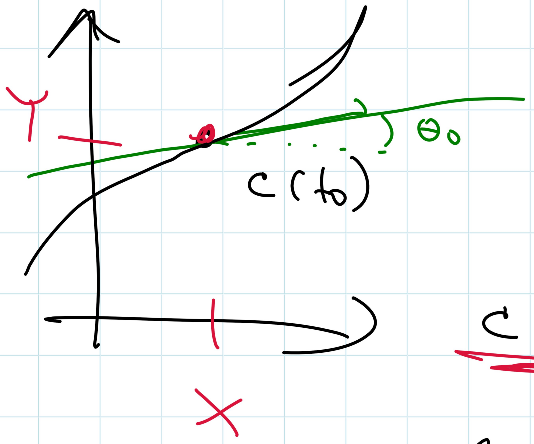
$k(t)$ ... $k_2(t)$

KONSTRUKCE

$$\theta'(t) = k_2 \cdot r = \underline{k}(t) \cdot \underline{r}(t)$$

$$\Theta(t) = \int k(t) \cdot r(t)$$

musím volit $\Theta(t_0) = \Theta_0$

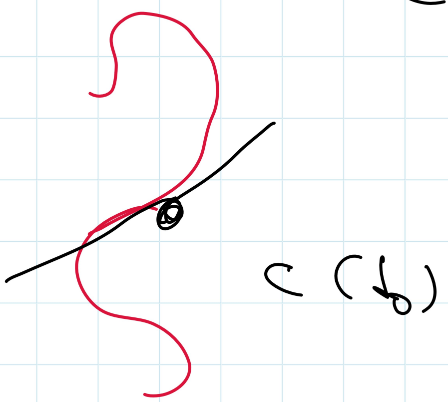


$$\vec{t} = (\cos\Theta(t), \sin\Theta(t))$$

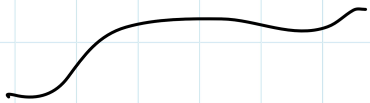
$$c' = \|c'\| \cdot \vec{t} = r \cdot \vec{t}$$

$c(t) = \int c'$ ... integr. konstanta

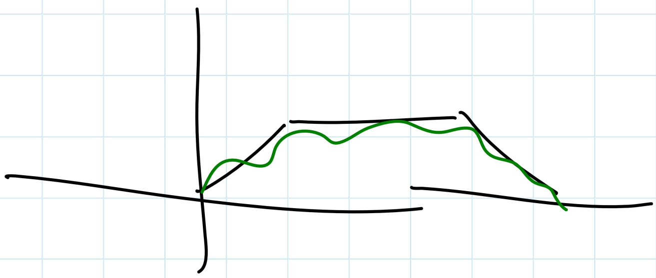
$$c(t_0) = (x, y)$$



$$c(t) = \begin{pmatrix} c_x(t) \\ c_y(t) \end{pmatrix}$$



$$\underline{\underline{n = 4}}$$



$$B^4_2(t) =$$

$$= \binom{4}{2}(1-t)^{4-2} \cdot t^2 = \underline{\underline{6\, t^2 (1-t)^2}}$$

$$\sum_{P_2} [-3, 7] \cdot B^4_2(t)$$