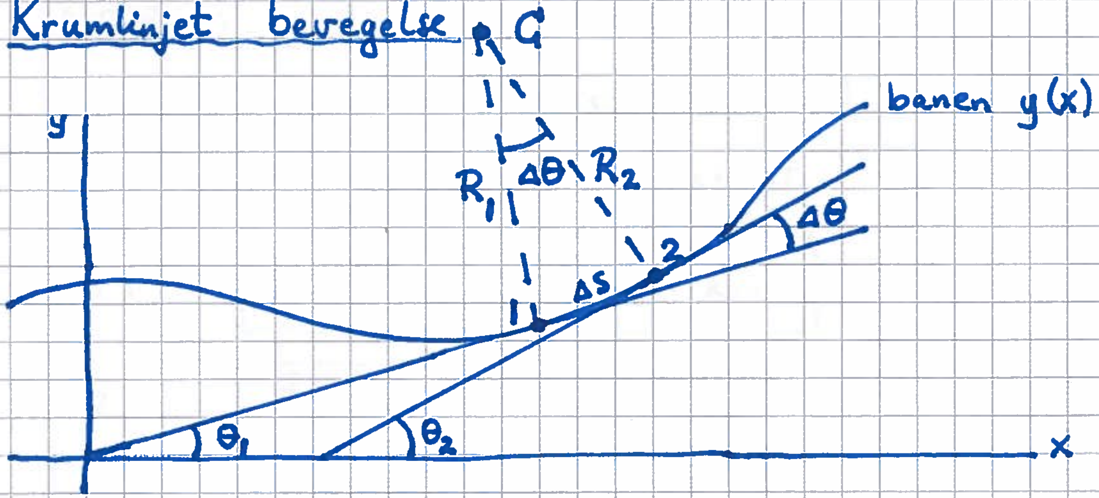
Krumlinjet bevegelse



$$\vec{a} = \underbrace{\dot{v}\,\hat{r}_{\parallel}}_{\text{baneaks.}} + \underbrace{\frac{v^2}{R}\,\hat{r}_{\perp}}_{\text{sentripetalaks.}}$$

R = radius i tenkt sirkel som "best" tangerer partikkelens bane

= <u>krumningsradien</u>

$v = \Delta s/\Delta t$; når $\Delta t \to 0$ er $R_1 \approx R_2 \approx R$, og

$\Delta s \approx R\,\Delta\theta$ = sirkelbuens lengde fra 1 til 2

$$\Rightarrow R = \Delta s/\Delta\theta \;\to\; ds/d\theta \quad ; \quad \mathcal{H} = 1/R = \Delta\theta/\Delta s \;\to\; d\theta/ds \quad = \text{banens krumning}$$

Pythagoras : $(ds)^2 = (dx)^2 + (dy)^2 \Rightarrow ds = dx \cdot \sqrt{1+\left(\frac{dy}{dx}\right)^2}$

Kjerneregel : $\mathcal{H} = \frac{d\theta}{dx} \cdot \frac{dx}{ds} = \frac{d\theta}{dx} \cdot \frac{1}{\sqrt{1+(dy/dx)^2}}$

Fra figur: $\tan\theta = dy/dx \Rightarrow \theta = \arctan(dy/dx)$

$$\Rightarrow \frac{d\theta}{dx} = \frac{1}{1+(dy/dx)^2} \cdot \frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{d^2y/dx^2}{1+(dy/dx)^2}$$

Dermed:

$$\mathcal{H} = \frac{|d^2y/dx^2|}{[1+(dy/dx)^2]^{3/2}} \quad ; \quad R = \frac{[1+(dy/dx)^2]^{3/2}}{|d^2y/dx^2|}$$