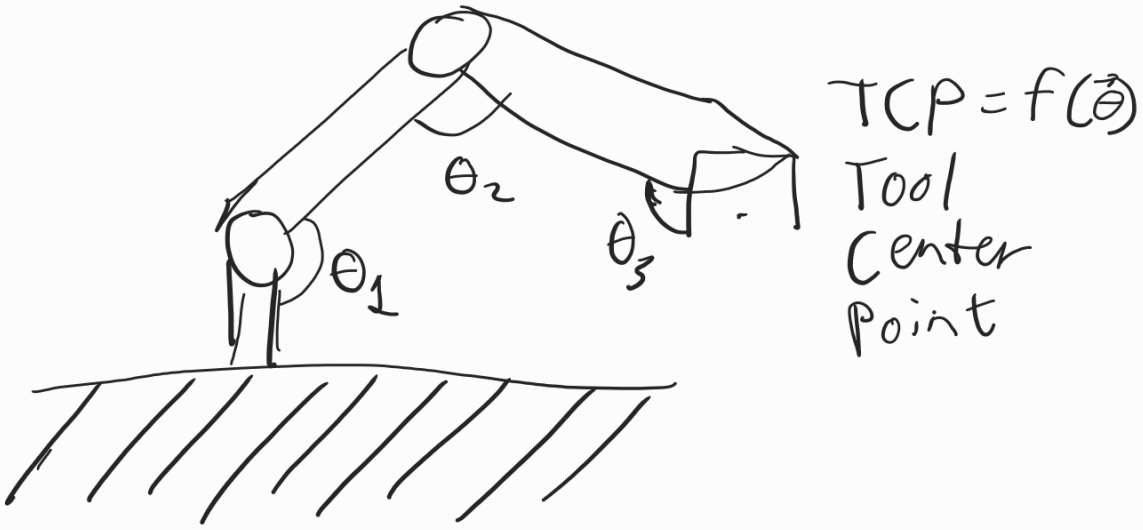
Finde rødder numerisk



$$f(\vec{\theta}) = \vec{dp}$$

$\vec{\theta}$: ukendte vinkel

$\vec{dp}$: desired point (Hvor skal vi hen?)

$$f(\vec{\theta}) - \vec{dp} = \vec{0}$$

Simpelt eksempel

- en variabel

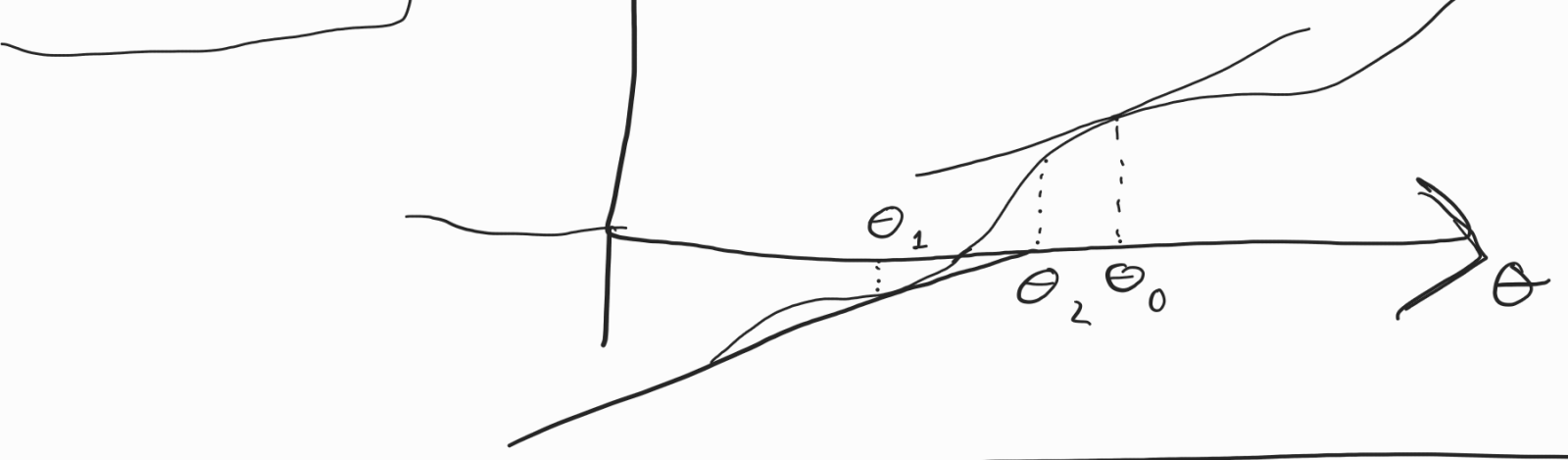
$$f(\theta) - dp = 0$$

HELT simpelt $dp = 0$

$f(\theta) = 0$

θ: variabel

$f(\theta)$



Procedure

- Bestem tangent linjen l til grafen for f i $(\theta, f(\theta))$
- Løs ligningen $L(\theta) = 0$

$$\alpha\theta + \beta = 0$$

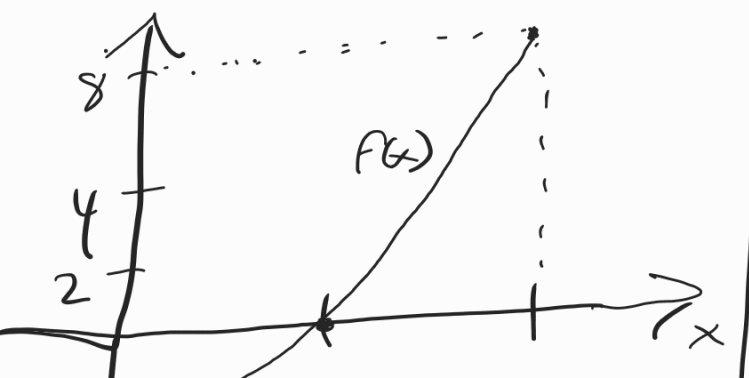
↑ hældnings koefficient

↑ skæringspunkt med y.

$$\theta_{i+1} = -\frac{\beta}{\alpha}$$

- Gentag indtil stophkriterie er opfyldt

Eks.
$f(x) = x^3 + x - 2$



$x_0 = 2$, $f(2) = 8$

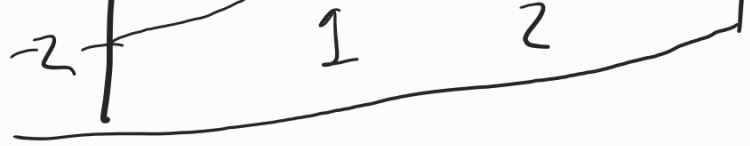
$f'(x) = 3x^2 + 1$

$f'(2) = 3 \cdot 4 + 1 = 13$

$L(x) = f(x_0) + f'(x_0)(x - x_0)$

$0 = f(x_0) + f'(x_0)(x - x_0)$

$x = -f(x_0) + f'(x_0)\, x_0$



$$= \frac{f(x_0)}{f'(x_0)} + \frac{\cancel{f'(x_0)}}{\cancel{f'(x_0)}} x_0$$

$$= x_0 - \frac{f(x_0)}{f'(x_0)}$$

videre med eksempel.

$$0 = 8 + 13 \cdot (x-2)$$
$$0 = 13x - 18$$
$$x = \frac{18}{13} \approx 1{,}38$$

↑ Nyt gæt, dvs. x_1

$x_1 = 1{,}38 \quad f(1{,}38) = 2{,}008$

$f'(1{,}38) = 6{,}7132$

x_1

$L(x) = 2{,}008 + 6{,}7132 \cdot (x - 1{,}38)$

$0 = 2{,}008 + 6{,}7132 \cdot (x - 1{,}38)$

$= 6{,}7132x - 7{,}256$

$x = \frac{7{,}256}{6{,}7132} = 1{,}0808$

↑ x_2

I numerisk metode bruger man decimaltal.

$f(x) \approx 0$