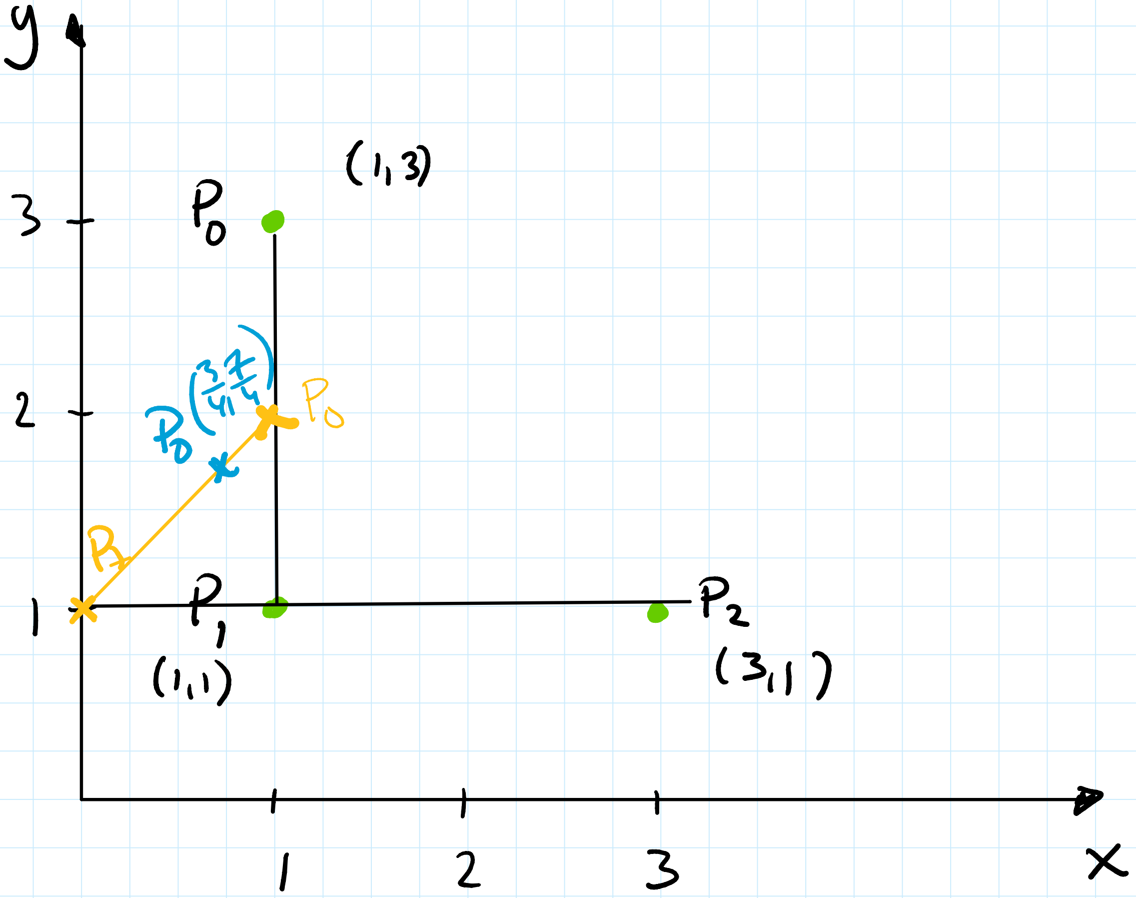
Neville eks 22/2

22. februar 2022 11.30

Neville grad $d=2$, 3 kontrollpunkter, $0 \le t \le 2$



NevilleSimple med $d=2$

level $=2$

mt $[\,0 \quad 1 \quad 2\,]$ t-verdier i kontrollpunktene

$\quad\;\; t_0 \quad t_1 \quad t_2$

for ... $j=0$

$$P_0 = P_0 \frac{t_1 - t}{\underbrace{t_1 - t_0}_{=1}} + P_1 \frac{t - t_0}{\underbrace{t_1 - t_0}_{=1}}$$

$$= P_0 (t_1 - t) + P_1 (t - t_0)$$

$$= P_0(1-t) + P_1 \cdot t$$

Tilsvarende for $j=1$

$$P_1 = P_1 \frac{t_2 - t}{t_2 - t_1} + P_2 \frac{t - t_1}{\underset{2}{t_2} - \underset{1}{t_1}}$$

$$= P_1(2-t) + P_2(t-1)$$

(*) svarer til X i (5.5)

(*)(*) svarer til Y i (5.5)

$i=1$ og $d=1$ i algoritmen

$$P_0 = P_0 \frac{t_2 - t}{\underset{2}{t_2} - \underset{0}{t_0}} + P_1 \frac{t - t_0}{t_2 - t_0}$$ fra 1. løkke

$$= P_0 \cdot \frac{2-t}{2} + P_1 \cdot \frac{t}{2}$$ 1. linje i ligning 5.5

Eksempel $t = \frac{1}{2}$

(*) $P_0 = \frac{1}{2} P_0 + \frac{1}{2} P_1 = \frac{1}{2}(1,3) + \frac{1}{2}(1,1) = (1,2)$

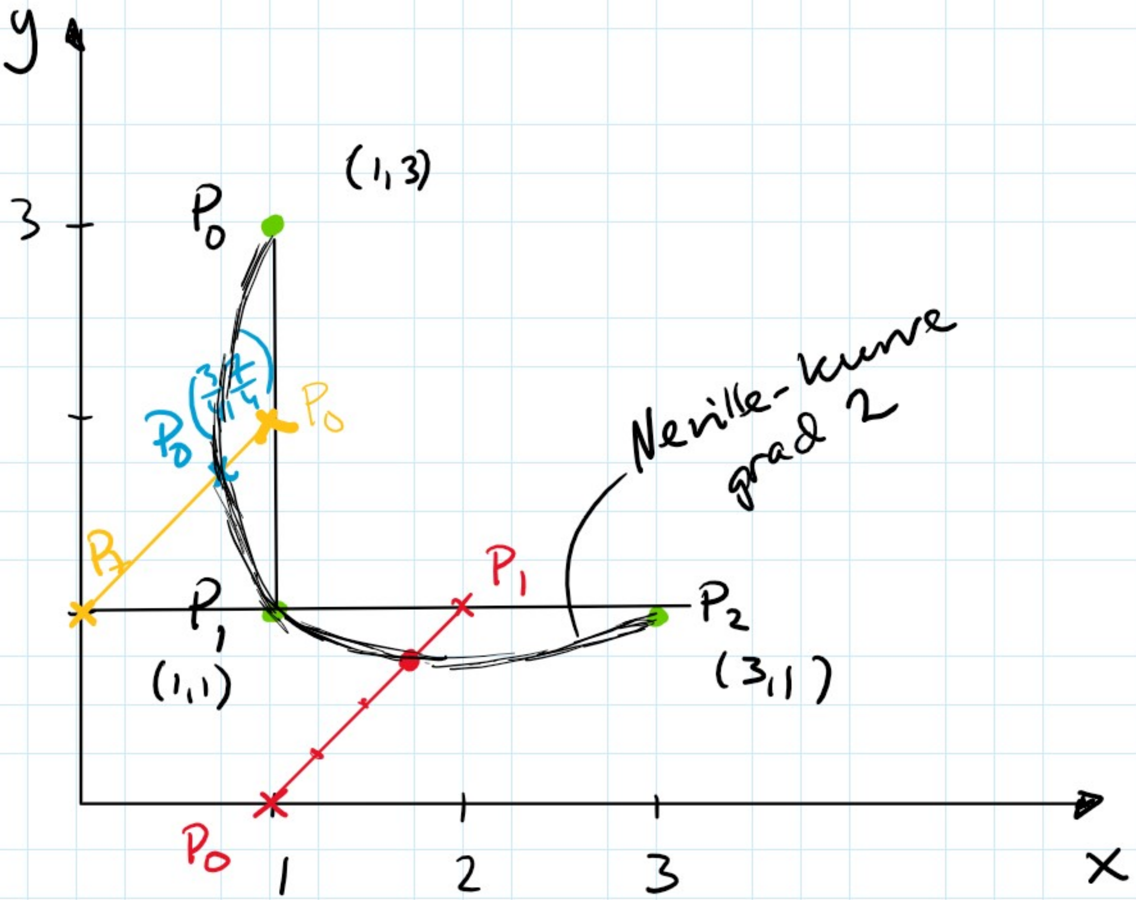
(*)(*) $P_1 = \frac{3}{2} P_1 - \frac{1}{2} P_2 = \frac{3}{2}(1,1) - \frac{1}{2}(3,1) = (0,1)$

$$P_0 = P_0 \cdot \frac{3}{4} + P_1 \cdot \frac{1}{4} = (1,2) \cdot \frac{3}{4} + (0,1) \cdot \frac{1}{4}$$

$$P_0 = P_0 \cdot \frac{3}{4} + P_1 \cdot \frac{1}{4} = (1,2)\cdot\frac{3}{4} + (0,1)\cdot\frac{1}{4}$$

$$= \left(\frac{3}{4}, \frac{7}{4}\right)$$

Øving: Regn ut for $t = \frac{3}{2}$.



$t = \frac{3}{2}$ $\quad d = 2$ $\quad$ (litt endret fra kode-figur)

$$P_0 = P_0\left(-\frac{1}{2}\right) + P_1 \cdot \frac{3}{2}$$

$$= (1,3)\left(-\frac{1}{2}\right) + (1,1)\cdot\frac{3}{2} = (1,0)$$

$$= (1,3)\left(-\tfrac{1}{2}\right) + (1,1)\cdot\tfrac{3}{2} = (1,0)$$

$$P_1 = P_1\cdot\tfrac{1}{2} + P_2\cdot\tfrac{1}{2}$$

$$= (1,1)\cdot\tfrac{1}{2} + (3,1)\cdot\tfrac{1}{2} = (2,1)$$

$$P_0 = (1,0)\cdot\tfrac{1}{4} + (2,1)\cdot\tfrac{3}{4} = \left(\tfrac{7}{4},\tfrac{3}{4}\right)$$

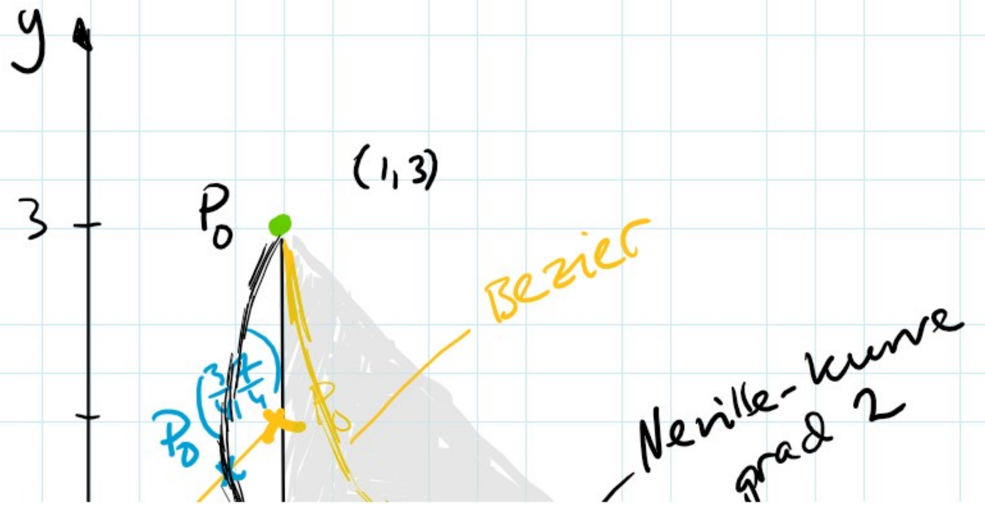
Neville og basisfunksjoner

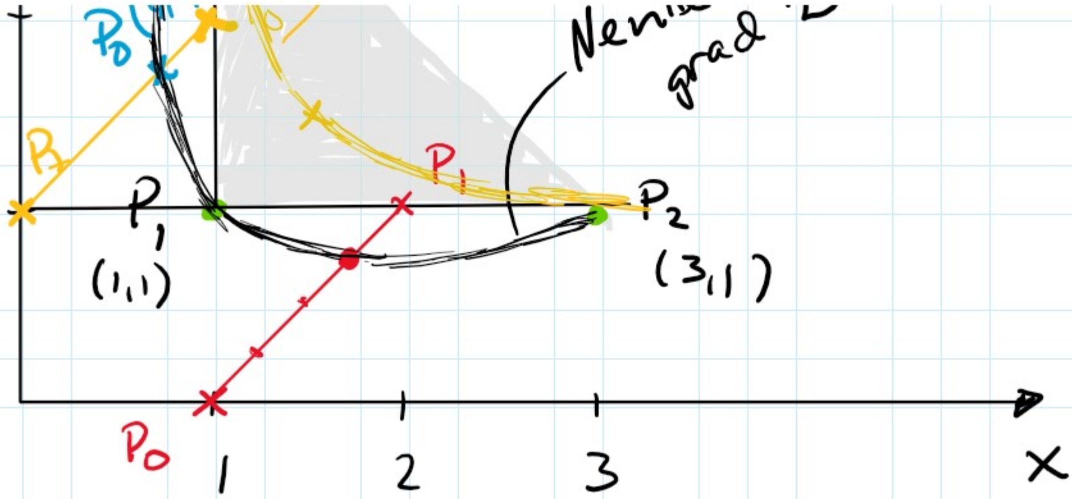
$$P_0 = \left[P_0(1-t) + P_1\cdot t\right]\frac{2-t}{2} + \left[P_1(2-t) + P_2(t-1)\right]\frac{t}{2}$$

$$= P_0\cdot\underbrace{\tfrac{1}{2}(1-t)(2-t)} + P_1\cdot\underbrace{t\cdot\tfrac{2-t}{2}} + P_2\cdot\underbrace{\tfrac{1}{2}t(t-1)}$$

som midt på side 54

Dette er Lagrange basisfunksjoner for $d=2$





P_1
(1,1)
P_2
(3,1)
P_0
1
2
3
x