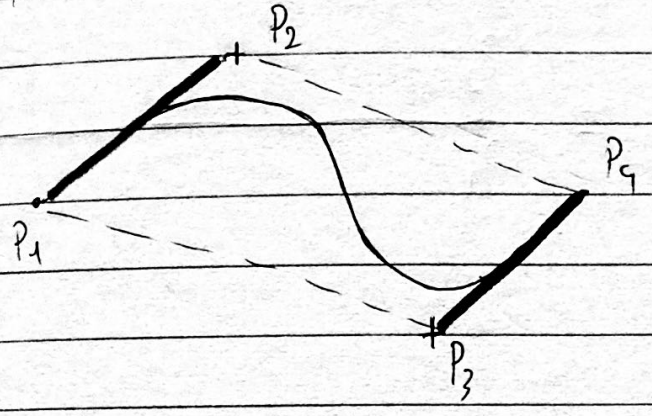
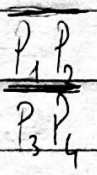
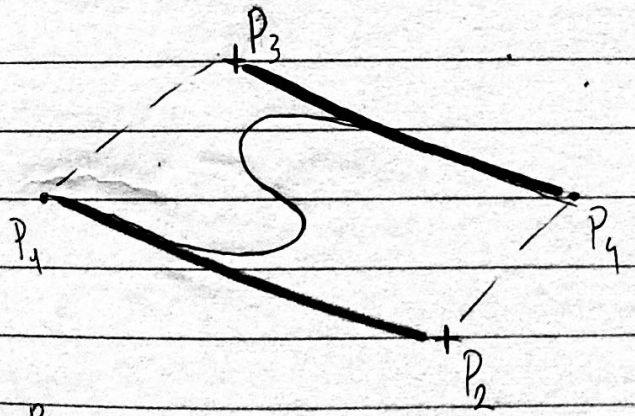
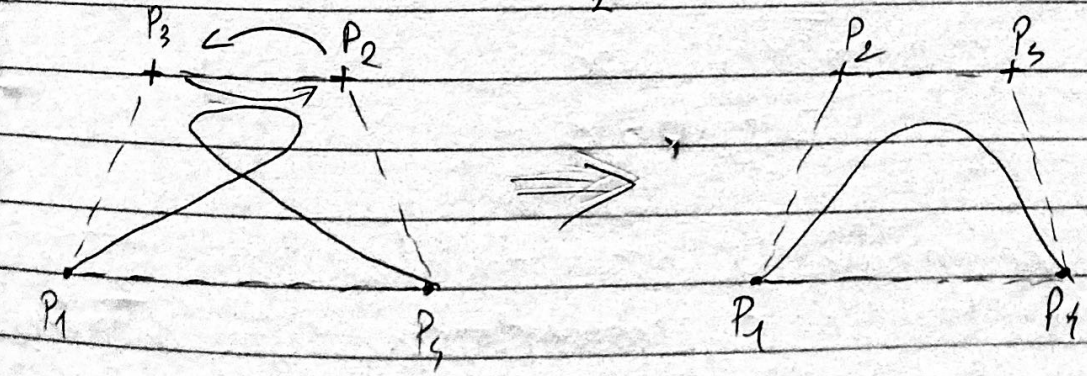
Bezier krivulja

Bezier krivulja je glavna krivulja današnje vektorske grafike, koristi se u svim vektorskim paketima za dizajn koji se nude trenutno na tržištu.

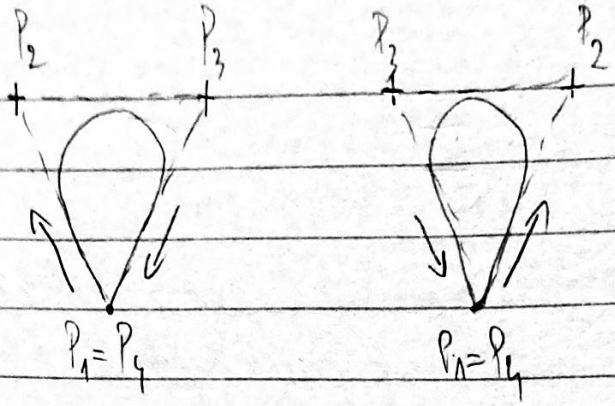




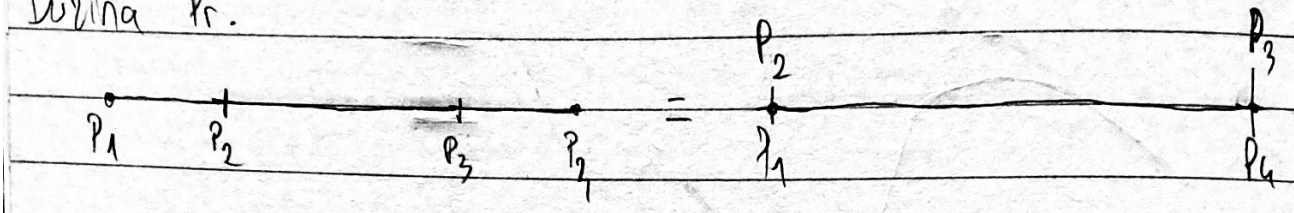




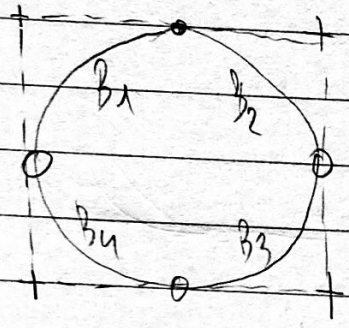
Važno je naglasiti da je indeksacija točka vrlo važna jer utječe na tijek, tj. izgled krivulje.



Dužina Pr.



Kružnica



Matematički izvod
Bezier krivulje

Bezier krivulja je definirana u osam točaka koordinatnog sustava. Bezier krivulja je parametarska krivulja trećeg stupnja.

$$C(t) = \underset{1\times4}{[t^3 \; t^2 \; t \; 1]} \cdot \underset{4\times4}{B} \cdot \underset{4\times1}{\begin{bmatrix} P_1 \\ P_2 \\ P_3 \\ P_4 \end{bmatrix}}$$

$t \in [0,1]$

$$B = \begin{bmatrix} -1 & 3 & -3 & 1 \\ 3 & -6 & 3 & 0 \\ -3 & 3 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix} \begin{matrix} \varepsilon=0 \\ \varepsilon=0 \\ \varepsilon=0 \\ \varepsilon=1 \end{matrix}$$

$\varepsilon=0 \quad \varepsilon=0 \quad \varepsilon=0 \quad \varepsilon=1$

$$x(t) = (-t^3 + 3t^2 - 3t + 1) \cdot P_1^x + (3t^3 - 6t^2 + 3t) \cdot P_2^x + (-3t^3 + 3t^2) \cdot P_3^x + t^3 \cdot P_4^x$$

$$y(t) = (-t^3 + 3t^2 - 3t + 1) \cdot P_1^y + (3t^3 - 6t^2 + 3t) \cdot P_2^y + (-3t^3 + 3t^2) \cdot P_3^y + t^3 \cdot P_4^y$$

$t = 0 \quad x(0) = P_1^x, \; y(0) = P_1^y \} P_1$

$t = 1 \quad x(1) = P_4^x, \; y(1) = P_4^y \} P_4$

Δt

Ako je $\Delta t = 0,1$ onda je $t_0 = 0$

$t_1 = t_0 + \Delta t = 0 + 0,1 = 0,1$

$t_2 = 0.2$

$\vdots$

$t_9 = 0.9$

$t_{10} = 1$

$\Delta t = 0,1$ ⇓ 11 t-ova

Ako je $\Delta t = 0,01 \Rightarrow t = 101$ t-ova

$\Delta t = 0,001 \Rightarrow t = 1001$ tova

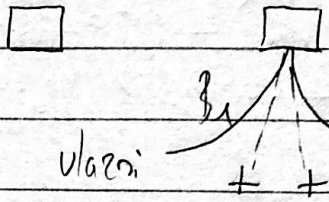
$$\text{Broj točaka} = \frac{1}{\Delta t} + 1$$

Spojne Bezier točke

3 vrste spojnih Bezier točaka

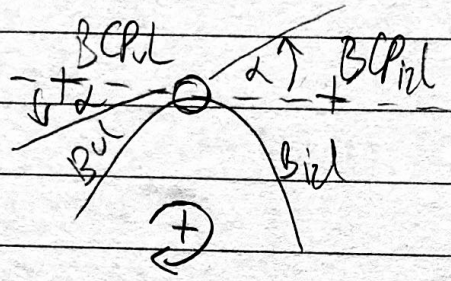
1. vrsta je kutni spoj.

$\exists CP_{izl} \neq \exists CP_{ul}$



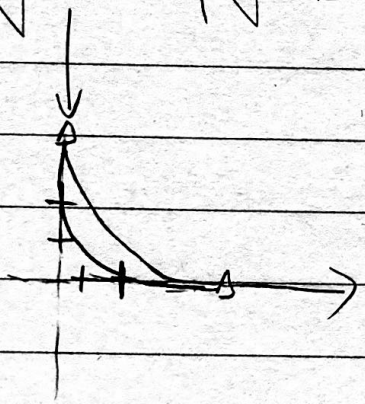
⊕ ← orijentacija koordinatnog sustava

2. Krivuljni spoj



$\exists CP_{izl} = \not\propto$ prava
($\exists CP_{ul}$, spojna točka)

3. Tangentni spoj Δ



Pomoću tangentnog spoja radimo idealan zavoj između dvije točke.