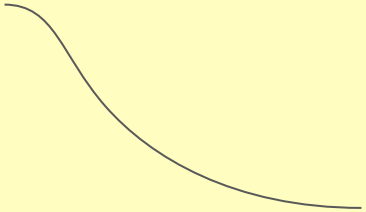


Bézier Interpolation

Nesari and Afroozi

Bézier Curve Definition

It's defined by a set of control points:

$$\{P_0, \ldots, P_n\}$$

General Recursive Definition:

$$\begin{cases} B_{P_0} = P_0 \\ B(t) = B_{P_0,\ldots,P_n}(t) = (1-t)B_{P_0,\ldots,P_{n-1}}(t) + tB_{P_1,\ldots,P_n}(t) \\ t \in [0,1] \end{cases}$$

Linear (two control points):

$$B_{P_0,P_1}(t) = (1-t)P_0 + tP_1$$

Quadratic (three control points):

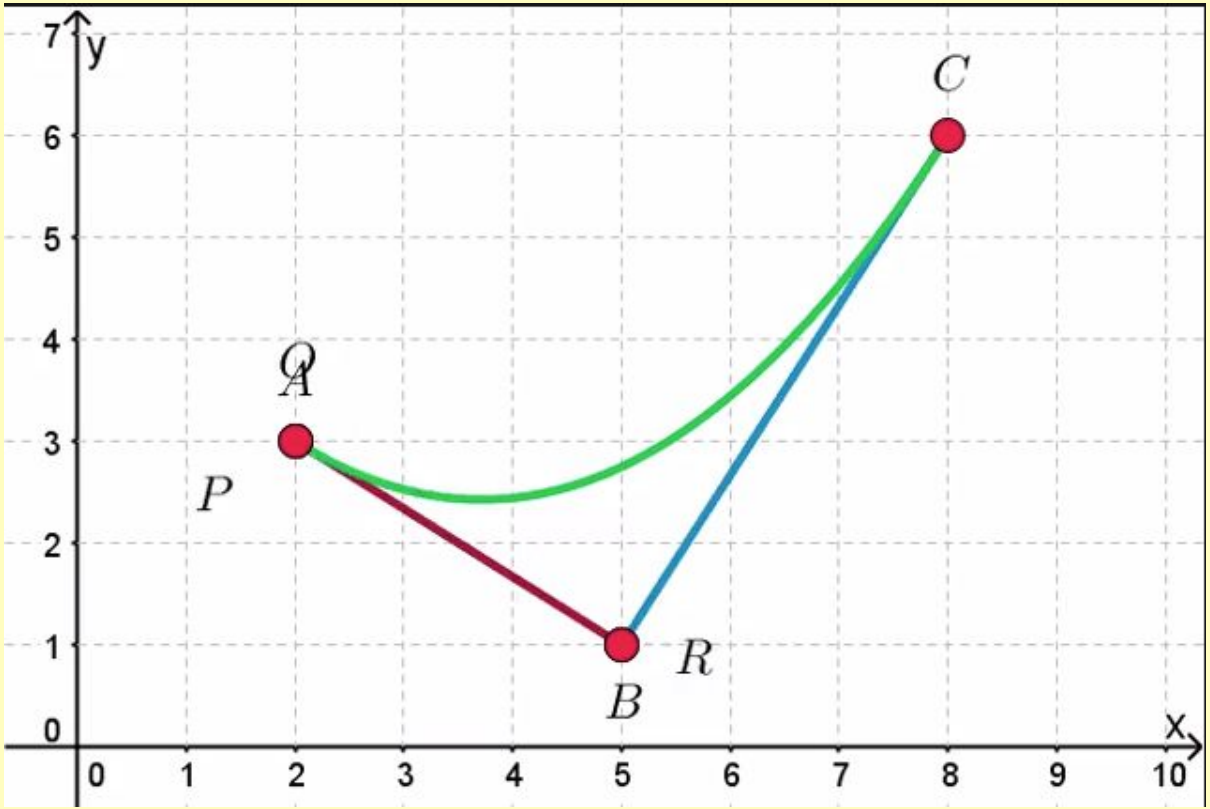
$$\begin{aligned} B_{P_0,P_1,P_2}(t) &= (1-t)B_{P_0,P_1}(t) + tB_{P_1,P_2}(t) \\ &= P_1 + (1-t)^2(P_0 - P_1) + t^2(P_2 - P_1) \end{aligned}$$

Cubic (four control points):

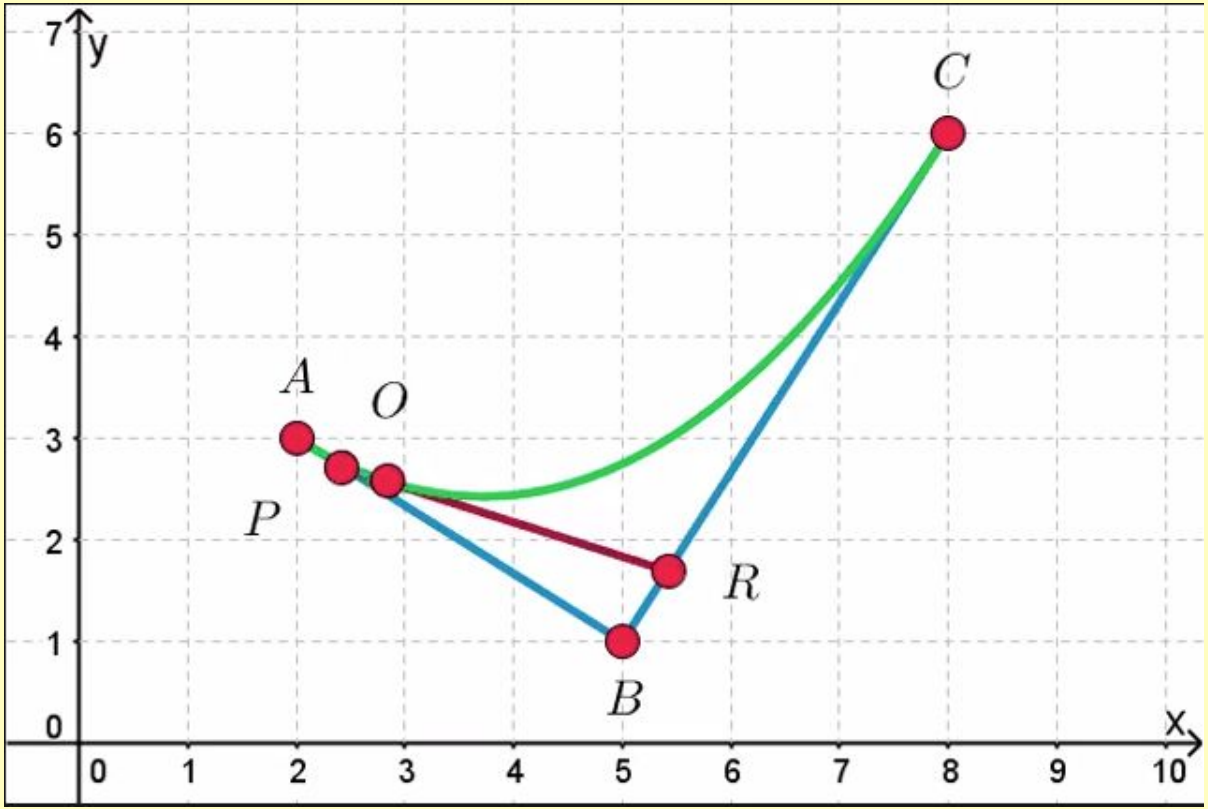
$$\begin{aligned} B_{P_0,P_1,P_2,P_3}(t) &= (1-t)B_{P_0,P_1,P_2}(t) + tB_{P_1,P_2,P_3}(t) \\ &= (1-t)^3P_0 + 3(t-t)^2tP_1 + 3(1-t)t^2P_2 + t^3P_3 \end{aligned}$$

And so on.

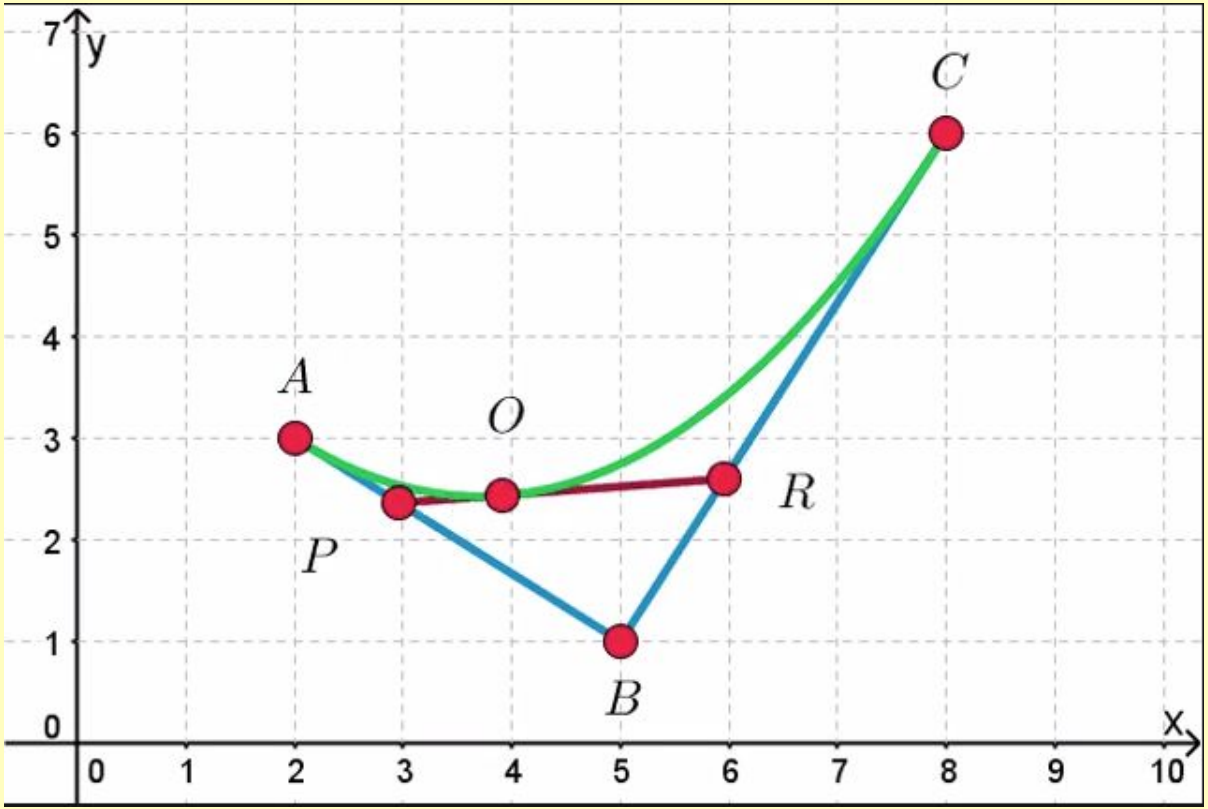
Construction Of a Quadratic Bézier Curve



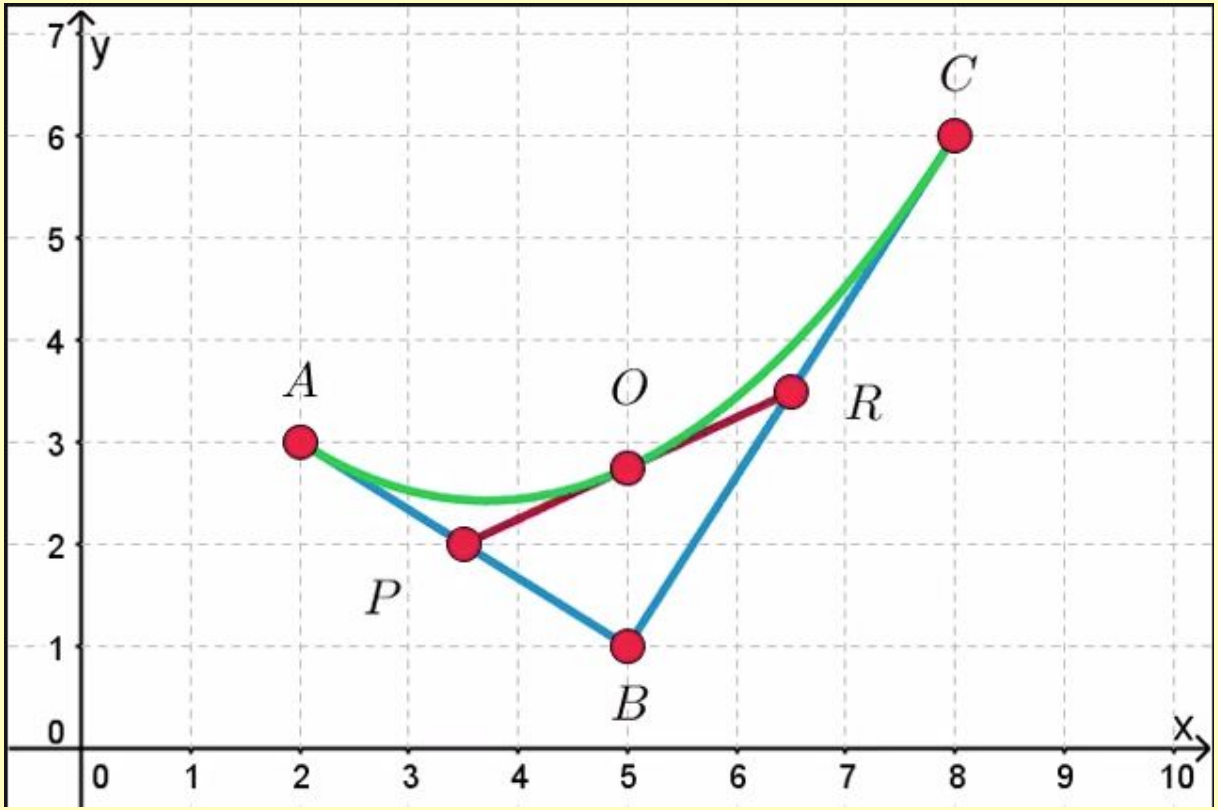
Construction Of a Quadratic Bézier Curve



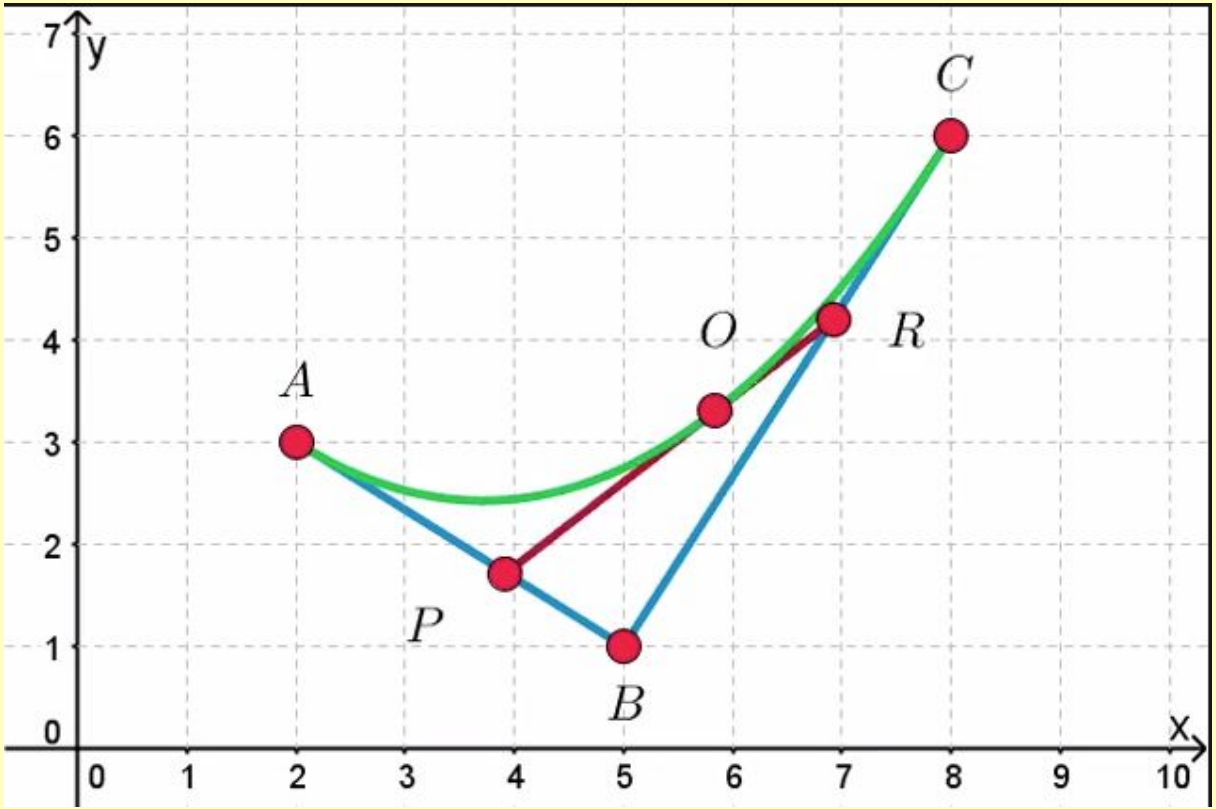
Construction Of a Quadratic Bézier Curve



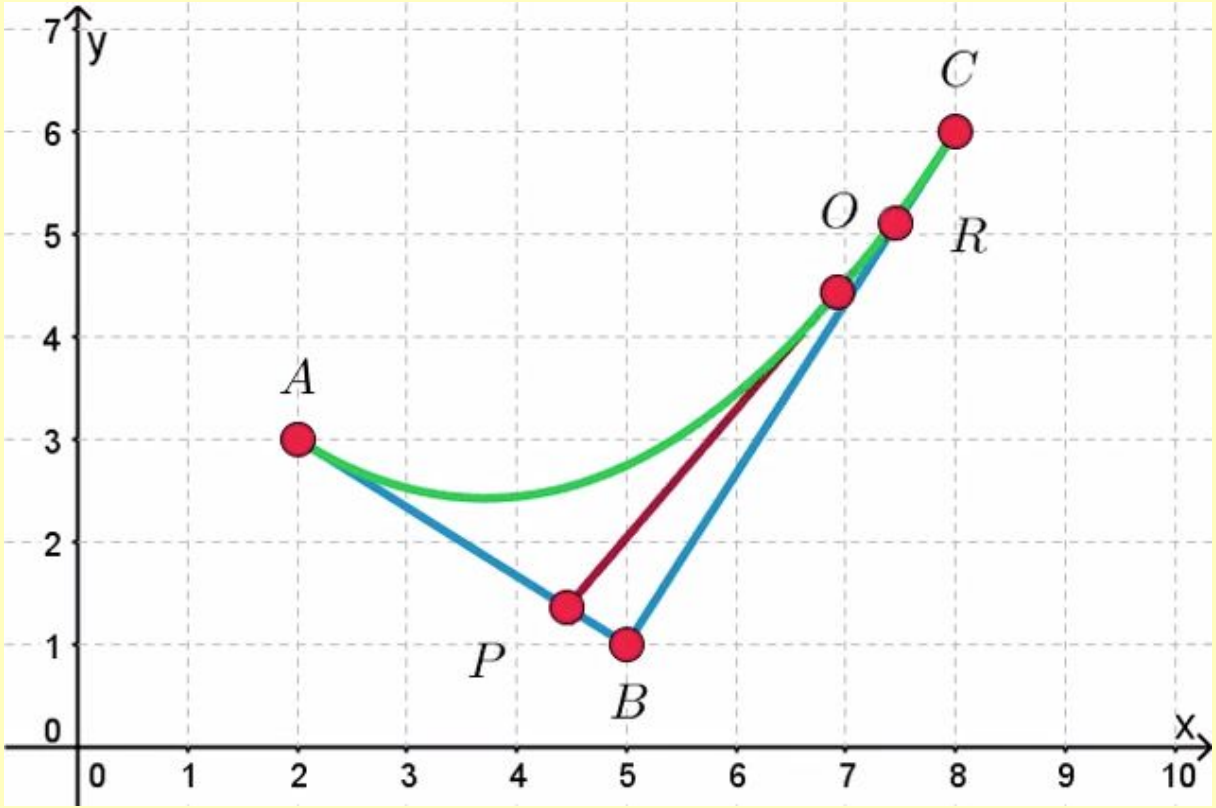
Construction Of a Quadratic Bézier Curve



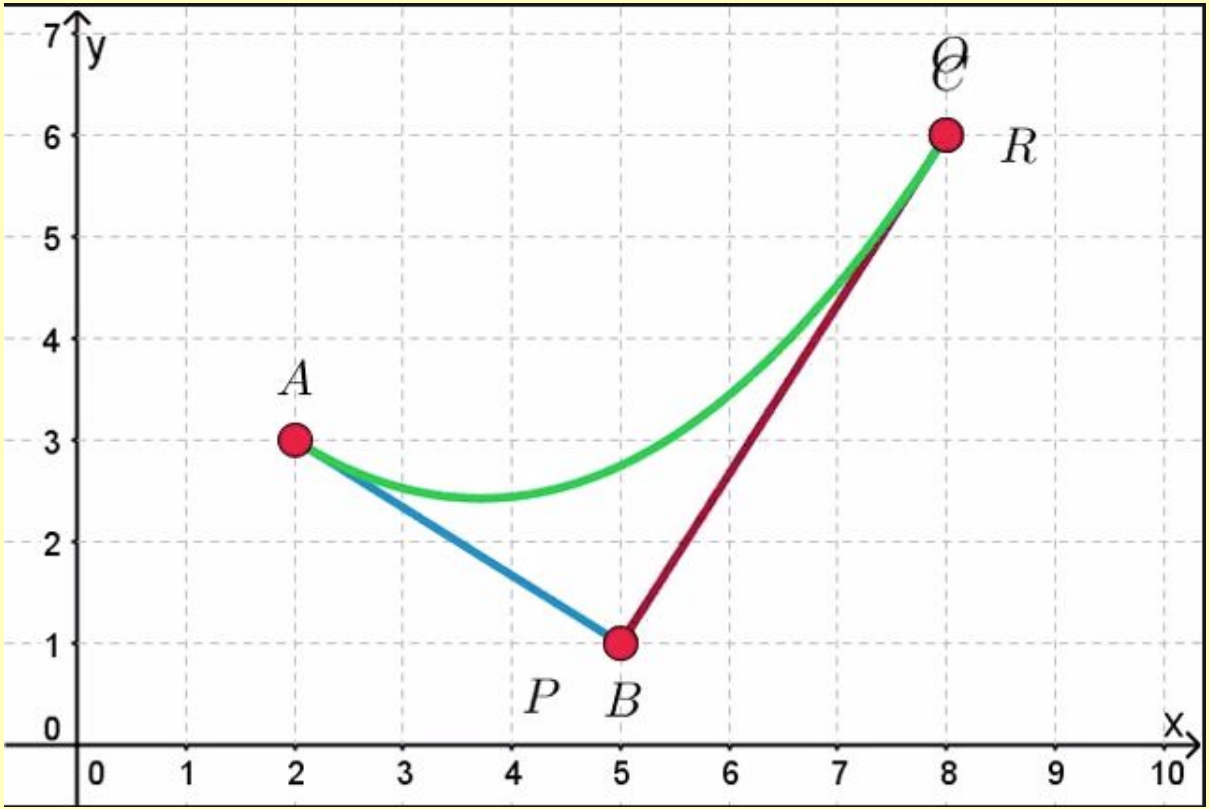
Construction Of a Quadratic Bézier Curve



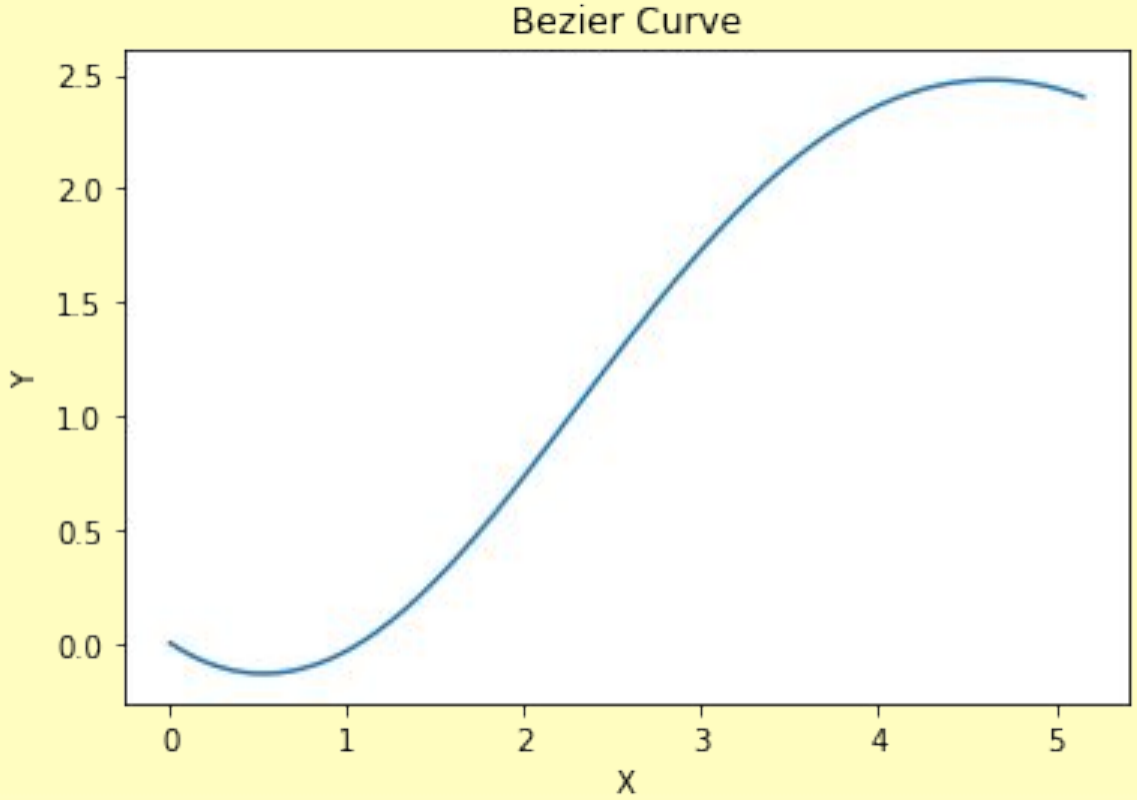
Construction Of a Quadratic Bézier Curve



Construction Of a Quadratic Bézier Curve



$$P_0 = (0,0),\ P_1 = (2,\ -1),\ P_2 = (3,\ 4),\ P_3 = (6,2)$$



$$P_0 = (2, -1),\ P_1 = (0, 0),\ P_2 = (6, 2),\ P_3 = (3, 4)$$