The problem is to connect two Bézier curves.

This is a Bézier curve.

$$x = ((a\,t + b)\,t + c)\,t + d$$

$$y = ((e\,t + f)\,t + f)\,t + h$$

This is the first Bézier curve. $x = x_0$ when $t = 0$.

$$x_0 = ((a_0\,0 + b_0)\,0 + c_0)\,0 + d_0$$

Solve for d_0.

$$d_0 = x_0$$

Replace d_0.

$$x = ((a_0\,t + b_0)\,t + c_0)\,t + x_0$$

$$x - x_0 = a_0\ t^3 + b_0\ t^2 + c_0\ t$$

$x = x_3$ when $t = 1$.

$$x_3 - x_0 = a_0\ 1^3 + b_0\ 1^2 + c_0\ 1$$

Solve for c_0.

$$c_0 = -a_0 - b_0 - x_0 + x_3$$

Replace c_0.

$$x - x_0 = a_0\ t^3 + b_0\ t^2 + (-a_0 - b_0 - x_0 + x_3)\,t$$

$$x - x_0 = t\left(a_0\left(t^2 - 1\right) + b_0\,(t - 1) - x_0 + x_3\right)$$

Find the slope.

$$\frac{d}{dt}\left(x - x_0 = t\left(a_0\left(t^2 - 1\right) + b_0\,(t - 1) - x_0 + x_3\right)\right)$$

$$\frac{dx}{dt} = a_0\left(3\ t^2 - 1\right) + b_0\,(2\ t - 1) - x_0 + x_3$$

Define the slope.

$$q = \frac{dx}{dt}$$

$$q = a_0\left(3\ t^2 - 1\right) + b_0\,(2\ t - 1) - x_0 + x_3$$

$q = q_0$ when $t = 0$. Solve in graph space.

$$q_0 = \frac{x_1 - x_0}{\left(\frac{1}{3}\right)}$$

$$q_0 = 3\,(x_1 - x_0)$$

Solve in equation space.

$$q_0 = a_0\left(3 * 0^2 - 1\right) + b_0\,(2 * 0 - 1) - x_0 + x_3$$

$$q_0 = -a_0 - b_0 - x_0 + x_3 \qquad (1)$$

$q = q_3$ when $t = 1$. Solve in graph space.

$$q_3 = \frac{x_3 - x_2}{\left(\frac{1}{3}\right)}$$

$$q_3 = 3\,(x_3 - x_2)$$

Solve in equation space.

$$q_3 = a_0\left(3 * 1^2 - 1\right) + b_0\,(2 * 1 - 1) - x_0 + x_3$$

$$q_3 = 2\ a_0 + b_0 - x_0 + x_3 \qquad (2)$$

Add equation (1) and equation (2).

$$q_0 + q_3 = a_0 - 2\ x_0 + 2\ x_3$$

Solve for a_0.

$$a_0 = q_0 + q_3 + 2\,(x_0 - x_3)$$

Solve for b_0.

$$b_0 = -a_0 - q_0 - x_0 + x_3$$

$$b_0 = -\left(q_0 + q_3 + 2\,(x_0 - x_3)\right) - q_0 - x_0 + x_3$$

$$b_0 = -2\ q_0 - q_3 - 3\ x_0 + 3\ x_3$$

Find the rate of change of the slope.

$$\frac{d}{dt}\left(q = a_0\left(3\,t^2 - 1\right) + b_0\,(2\,t - 1) - x_0 + x_3\right)$$

$$\frac{dq}{dt} = 6\ a_0\ t + 2\ b_0$$

Define the rate of change of the slope.

$$p = \frac{dq}{dt}$$

$$p = 6\ a_0\ t + 2\ b_0$$

$p = p_0$ when $t = 0$.

$$p_0 = 6\ a_0\ 0 + 2\ b_0$$

$$p_0 = 2\ b_0$$

$p = p_3$ when $t = 1$.

$$p_3 = 6\ a_0\ 1 + 2\ b_0$$

$$p_3 = 6\ a_0 + 2\ b_0$$

$$p_3 = 6\ a_0 + p_0$$

Solve for a_0.

$$a_0 = \frac{p_3 - p_0}{6}$$

This is the second Bezier curve. It has the same slope and the same rate of change of slope at the common point $[x_3,\ y_3]$. The other end is the point $[x_6,\ y_6]$.

$$x - x_3 = t\left(a_1\left(t^2 - 1\right) + b_1\,(t - 1) - x_3 + x_6\right)$$

$$q = a_1\left(3\ t^2 - 1\right) + b_1\,(2\ t - 1) - x_3 + x_6$$

$$p = 6\ a_1\ t + 2\ b_1$$

$$q_3 = a_1\left(3 * 0^2 - 1\right) + b_1\,(2 * 0 - 1) - x_3 + x_6$$

$$q_3 = -a_1 - b_1 - x_3 + x_6$$

$$q_6 = a_1\left(3 * 1^2 - 1\right) + b_1\,(2 * 1 - 1) - x_3 + x_6$$

$$q_6 = 2\ a_1 + b_1 - x_3 + x_6$$

$$p_3 = 6\ a_1\ 0 + 2\ b_1$$

$$p_3 = 2\ b_1$$

$$p_6 = 6\ a_1\ 1 + 2\ b_1$$

$$p_6 = 6\ a_1 + 2\ b_1$$

The same equations for the first curve are:

$$q_0 = -a_0 - b_0 - x_0 + x_3$$

$$q_3 = 2\ a_0 + b_0 - x_0 + x_3$$

$$p_0 = 2\ b_0$$

$$p_3 = 6\ a_0 + 2\ b_0$$

Solve the eight equations.

$$a_0 = -\frac{5\,p_0 + p_6 - 6\,(x_0 - 2\,x_3 + x_6)}{24}$$

$$a_1 = \frac{p_0 + 5\,p_6 - 6\,(x_0 - 2\,x_3 + x_6)}{24}$$

$$b_0 = \frac{p_0}{2}$$

$$b_1 = -\frac{p_0 + p_6 - 6\,(x_0 - 2\,x_3 + x_6)}{8}$$

$$p_3 = -\frac{p_0 + p_6 - 6\,(x_0 - 2\,x_3 + x_6)}{4}$$

$$q_3 = \frac{p_0 - p_6 + 6\,(x_6 - x_0)}{12}$$

$$q_0 = -\frac{7\,p_0 - p_6 + 6\,(5\,x_0 - 6\,x_3 + x_6)}{24}$$

$$q_6 = -\frac{p_0 - 7\,p_6 - 6\,(x_0 - 6\,x_3 + 5\,x_6)}{24}$$