The way the Bézier curve is usually representated is:

$$x = a\ t^3 + b\ t^2 + c\ t + x_0$$
$$y = d\ t^3 + e\ t^2 + f\ t + y_0$$

This does not represent the nature of the function very well. Both ends of the function are the same. Point $\{x_0,y_0\}$ can be exchanged with point $\{x_3,y_3\}$ without changing the function. A better way to represent the Bézier curve is in terms of variable u, where $u = 2\ t - 1$.
$u = -1$ when $t = 0$ and $u = +1$ when $t = 1$.
Now the Bézier curve is:

$$x = a_3\ u^3 + a_2\ u^2 + a_1\ u + a_0$$
$$y = b_3\ u^3 + b_2\ u^2 + b_1\ u + b_0$$

$u = -1$ at point $\{x_0,y_0\}$ and $u = +1$at point $\{x_3,y_3\}$.

$$x_0 = a_3\ (-1)^3 + a_2\ (-1)^2 + a_1\ (-1) + a_0$$
$$x_3 = a_3\ (+1)^3 + a_2\ (+1)^2 + a_1\ (+1) + a_0$$

$$a_0 = \frac{x_3 + x_0}{2} - a_2$$
$$a_1 = \frac{x_3 - x_0}{2} - a_3 \qquad (1)$$

We do not have to solve for the y values since they look just like the x values.

$$b_0 = \frac{y_3 + y_0}{2} - b_2$$
$$b_1 = \frac{y_3 - y_0}{2} - b_3$$

Two more control points are needed to find the curve. These control points set the slope and velocity at the end points of the curve.

$$\frac{dx}{du} = 3\ a_3\ u^2 + 2\ a_2\ u + a_1$$

When $t = \frac{1}{3}$ then $u = -\frac{1}{3}$ and when $t = \frac{2}{3}$ then $u = +\frac{1}{3}$.

When $u = -1$ then $x_1 = x_0 + \frac{dx}{du}\left(\frac{2}{3}\right)$.

When $u = +1$ then $x_3 = x_2 + \frac{dx}{du}\left(\frac{2}{3}\right)$.

$$x_1 = x_0 + (\ 3\ a_3\ (-1)^2 + 2\ a_2\ (-1) + a_1)\left(\frac{2}{3}\right).$$

$$x_3 = x_2 + (\ 3\ a_3\ (+1)^2 + 2\ a_2\ (+1) + a_1)\left(\frac{2}{3}\right).$$

$$x_1 = x_0 + 2\,a_3 - \frac{4}{3}\,a_2 + \frac{2}{3}\,a_1$$

$$x_3 = x_2 + 2\,a_3 + \frac{4}{3}\,a_2 + \frac{2}{3}\,a_1$$

$$x_3 - x_1 = x_2 - x_0 + \frac{8}{3}\,a_2$$

$$a_2 = \frac{3\,(x_3 - x_2 - x_1 + x_0)}{8}$$

$$x_3 + x_1 = x_2 + x_0 + 4\,a_3 + \frac{4}{3}\,a_1 \qquad (2)$$

Combine equations (1) and (2).

$$x_3 + x_1 = x_2 + x_0 + 4\,a_3 + \frac{4}{3}\left(\frac{x_3 - x_0}{2} - a_3\right)$$

$$3\,(x_3 + x_1 - x_2 - x_0) = 12\,a_3 + 2\,(x_3 - x_0) - 4\,a_3$$

$$x_3 + 3\,(x_1 - x_2) - x_0 = 8\,a_3$$

$$a_3 = \frac{x_3 + 3\,(x_1 - x_2) - x_0}{8}$$

We do not have to solve for the y values since they look just like the x values.

$$b_2 = \frac{3\,(y_3 - y_2 - y_1 + y_0)}{8}$$

$$b_3 = \frac{y_3 + 3\,(y_1 - y_2) - y_0}{8}$$

Now I solved for the Bézier curve only using Times-Roman and Times-Roman Italic. It was a lot harder to use WordPerfect than using TeX but I like the results better. The Bézier in terms of u is more like the actual curve than in terms of t.