

CS 557
Homework 15
Due Tuesday, 3 November 2009

1. Find the implicit equation of the degree-two polynomial Bézier curve with control points:

$$\mathbf{P}_0 = (0, 0), \quad \mathbf{P}_1 = (1, 4), \quad \mathbf{P}_2 = (2, 2).$$

Use the method discussed in Section 16.6 in the notes.

2. Find two inversion equations for the curve in Problem 1.
3. Using the method in Section 16.6, find the implicit equation for the degree-three rational Bézier curve with control points and weights

$$\mathbf{P}_0 = (0, 0), \quad w_0 = 1; \quad \mathbf{P}_1 = (4, 0), \quad w_1 = 3; \quad \mathbf{P}_2 = (2, 2), \quad w_2 = 4; \quad \mathbf{P}_3 = (4, 4), \quad w_3 = 2.$$

Express the implicit equation as the determinant of a 3×3 matrix whose elements are linear in x and y . Just give the matrix; you do not need to multiply it out.

4. Give an inversion equation for the curve in Problem 3. The equation should be of the form

$$t = \frac{ax + by + c}{dx + ey + f}.$$

Using that equation, find the parameter value of the point on the curve whose Cartesian coordinates are $(\frac{202}{73}, \frac{40}{73})$.