

CS 557
Homework 7
Due Monday, 26 March 2001

1. Use Euclid's algorithm to find the GCD and common roots of

$$f(t) = -2 + 5t - 2t^2 - 2t^3 + t^4$$

$$g(t) = 2 - 5t + 6t^2 - 4t^3 + t^4$$

2. Find the Gröbner basis of $f(t)$ and $f'(t)$ where

$$f(t) = 1 + t - t^2 - 2t^3 - t^4 + t^5 + t^6$$

(The GCD of $f(t)$ and $f'(t)$ indicates the double roots of $f(t)$.)

3. Find the implicit equation of the curve:

$$x = \frac{t+2}{t^2+2t-1}; \quad y = \frac{2t^2+3t-1}{t^2+2t-1}$$

4. Find an inversion equation for the curve in problem 3.

5. Find the implicit and inversion equations for

$$x = t^3 + 1; y = t^3 + 3t^2 + 2;$$

6. Find the implicit equation and an inversion equation for a degree two Bézier curve with control points $\mathbf{P}_0 = (0, 1)$, $\mathbf{P}_1 = (1, 1)$, $\mathbf{P}_2 = (0, 0)$ and weights $w_0 = 2$, $w_1 = 1$, and $w_2 = 1$. Work directly in the Bernstein basis.

7. Find a Gröbner basis of

$$\langle x + y + z - 2, \quad 2x - y + 3z + 1, \quad x + 2y - z \rangle$$

using the term order $x > y > z$.