

CS557 W01
Homework #4
Due Friday, 2 February 2001

1. Convert the following power-basis polynomial into Bernstein form:

$$2t^4 - 3t^3 + t^2 - 4$$

2. Convert to a power-basis polynomial the following Bernstein basis polynomial:

$$4B_0^4(t) + 2B_1^4(t) - B_2^4(t) + 3B_3^4(t) + B_4^4(t).$$

3. Find all the roots of the polynomial equation

$$2t^3 - 3t^2 + t = 0.$$

4. Find all the roots of the polynomial equation

$$0t^3 + t^2 - 3t + 2 = 0.$$

5. What are the homogeneous coordinates of all points (X, Y, W) at which the curve

$$(2X - 3Y)(X + Y) + (5X - 2Y)W + 4W^2 = 0$$

intersects the line at infinity (that is, the line $W=0$)? What kind of a curve is this? (Ellipse, parabola, hyperbola)

6. What kind of curve (Ellipse, parabola, hyperbola) is

$$x = \frac{t^2 + 2t + 1}{2t^2 + 5t + 1}, \quad y = \frac{t^2 - 3t - 2}{2t^2 + 5t + 1}$$

7. According to Bezout's theorem, at how many points does the curve $x^2 + y^2 - x = 0$ intersect the curve

$$x = \frac{1 - t^2}{1 + t^2}, \quad y = \frac{2t}{1 + t^2}?$$

Find all the points of intersection. Express the answer in homogeneous coordinates (X, Y, W) .