

**CS 557**  
**Homework 6**  
**Due Monday, 26 February 2001**

1. A degree three interpolating curve passes through the following points at the indicated parameter values:

$$\mathbf{P}(0) = (1, 4), \quad \mathbf{P}(1) = (3, 5), \quad \mathbf{P}(2) = (1, 0), \quad \mathbf{P}(4) = (9, 20).$$

Find  $\mathbf{P}(3)$  using Lagrange polynomials.

2. Find  $\mathbf{P}(3)$  using Newton polynomials.

3. Find  $\mathbf{P}(3)$  using Neville's scheme.

4. A degree 3 Bézier curve has control points

$$\mathbf{P}_0 = (1, 1), \quad \mathbf{P}_1 = (3, 5), \quad \mathbf{P}_2 = (5, 6), \quad \mathbf{P}_4 = (8, 2).$$

How many line segments are needed to plot this curve if the error must be less than 0.001? (The endpoints of the line segments are evenly spaced in parameter space.)

5. Give a bound on the maximum error if the curve in problem 4 is approximated by a single degree two parametric curve  $\mathbf{Q}(t)$  such that

$$\mathbf{Q}(.25) = \mathbf{P}(.25), \quad \mathbf{Q}(.5) = \mathbf{P}(.5), \quad \mathbf{Q}(.75) = \mathbf{P}(.75).$$