Computer Aided Geometric Design

Homework #6

Due Tuesday, 22 September 2009

1. What are the control points of a degree two polynomial Bézier curve $\mathbf{P}_{[1,3]}(t)$ that is C^2 with a cubic polynomial Bézier curve $\mathbf{P}_{[0,1]}(t)$ whose control points are (0,0), (2,4), (4,4), (6,2)?

2. A degree two polynomial Bézier curve $\mathbf{P}(t)$ is G^2 with the circle $x^2 + y^2 - 1 = 0$. $\mathbf{P}_0 = (1, 0)$. There are many possible positions for $\mathbf{P}_1$ and $\mathbf{P}_2$ that will assure G^2 continuity with the circle. Describe the possible positions.

3. For a cubic polynomial, $f(1) = 3$, $f(2) = 4$, $f(3) = 5$, $f(4) = 4$. What is $f(5)$ and $f(6)$?

4. The main problem with forward differencing is numerical stability. Experiment with the C code in fdtest.c to get a feeling for how stable forward differencing is. This code computes the x-coordinate of n points on the Bézier curve with control points (2,5), (11,320), (397,200), (431,326). Experiment with this code to find the smallest value of n such that the last x-coordinate computed by the forward difference lies outside of the interval $[430.5, 431.5]$. Change the *float* type declarations to *double* and try it again.

Hand in this homework in class on 22 September.