

Computer Aided Geometric Design
Homework #3
Due Thursday, 10 September 2009

1. Given a rational cubic Bézier curve $\mathbf{P}_{[0,1]}(t)$ whose control points have the following Cartesian coordinates and weights:

$$\mathbf{P}_0 = (0, 0), \quad w_0 = 1; \quad \mathbf{P}_1 = (2, 0), \quad w_1 = 2; \quad \mathbf{P}_2 = (0, 4), \quad w_2 = 8; \quad \mathbf{P}_3 = (8, 8), \quad w_3 = 4.$$

subdivide at $t = \frac{1}{2}$ and find the control points and weights for $\mathbf{P}_{[0, \frac{1}{2}]}(t)$.

2. Degree elevate the curve in Problem 1. Report the control points and weights.

3. Find $y_1 = x_2$ for which the following polynomial cubic Bézier curve most nearly approximates a quarter circle. What is the maximum error? (Write a computer program and use trial and error).

$$\mathbf{P}_0 = (1, 0) \quad \mathbf{P}_1 = (1, y_1) \quad \mathbf{P}_2 = (x_2, 1) \quad \mathbf{P}_3 = (0, 1)$$

Hand in this homework in class on 10 September.