

CS 557
Homework 12
Due Tuesday, 13 October 2009

1. A Bernstein polynomial with interval coefficients is given as

$$p(t) = [1, 3] * (1 - t)^2 + [3, 5] * 2t(1 - t) + [2, 4]t^2.$$

Use the deCasteljau algorithm to compute:

$$p\left(\frac{1}{2}\right) = \quad p(2) = \quad p(4) =$$

At each step of the deCasteljau algorithm, when you perform the operation $P_i(1-t) + P_{i+1}t$, compute it using interval arithmetic but using the equivalent expression $P_i + (P_{i+1} - P_i)t$.

2. Repeat Problem 1, but when you perform the operation $P_i(1-t) + P_{i+1}t$, perform the arithmetic operations in that order (that is, do not use the equivalent expression $P_i + (P_{i+1} - P_i)t$).
3. For a certain degree two polynomial, $p(1) = [.999, 1.001]$, $p(2) = (1.999, 2.001)$, $p(3) = (3.999, 4.001)$. Use forward differencing to compute $p(4)$ and $p(5)$.
4. Given a power basis polynomial with interval coefficients

$$[1, 1.001] + [6, 6.006]t - [3, 3.003]t^2 + [4, 4.001]t^3$$

convert this polynomial to Bernstein basis.

5. Given a Bernstein basis polynomial with interval coefficients

$$[1, 1.001](1 - t)^3 + [6, 6.006] * 3t(1 - t)^2 - [3, 3.003] * 3t^2(1 - t) + [4, 4.001]t^3$$

convert this polynomial to power basis.