

Assignment 5: Curve Fitting by Cubic Spline, Bezier, and B-Spline Curves

This exercise studies the problem of curve fitting. You are asked to design software to draw cubic Bezier and B-spline curves to fit the data points described in Table 1. Let $f \in C[0.5, 13.5]$ have known values at 21 given points listed as follows. As discussed in the class, find a cubic Bezier curve and a cubic B-spline curve to fit the given data *duck.txt*.

j	1	2	3	4	5	6	7
x_j	0.9	1.3	1.9	2.1	2.6	3.0	3.9
$f(x_j)$	1.3	1.5	1.85	2.1	2.6	2.7	2.4
j	8	9	10	11	12	13	14
x_j	4.4	4.7	5.0	6.0	7.0	8.0	9.2
$f(x_j)$	2.15	2.05	2.1	2.25	2.3	2.25	1.95
j	15	16	17	18	19	20	21
x_j	10.5	11.3	11.6	12.0	12.6	13.0	13.3
$f(x_j)$	1.4	0.9	0.7	0.6	0.5	0.4	0.25

Table 1: **duck.txt** for Cubic Curve Fitting.

Locate the given points, plot your cubic Bezier curve and cubic B-spline curve on $[0.5, 13.5]$ with $\Delta u = 0.25$ (see the class notes) and compare your results with the cubic spline interpolant S for f as introduced in class.

Hint: Matlab provides a good graphical tool and meta files. If you have any questions, please make *reasonable* assumptions on the boundary conditions without distorting the original problem statement.

♠ You are asked to design software to draw a cubic spline interpolant, cubic Bezier and B-spline curves to interpolate the 41 data points given in *dataEa.txt*.

♣ You are asked to design software to draw a cubic spline interpolant, cubic Bezier and B-spline curves to interpolate the 21 data points given in *dataEb.txt*.