

Numerical Analysis II

Homework 3

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1. Use the extended Newton divided difference method to obtain a quartic polynomial that takes these values:

x	0	1	2
$p(x)$	2	-4	44
$p'(x)$	-9	4	

2. (Continuation) Find a quintic polynomial that takes the values given in the preceding problem and, in addition, satisfies $p(3) = 2$.

Hint: add a suitable term to the polynomial found in the preceding problem.

3. Determine whether the following is a quadratic spline function.

$$f(x) = \begin{cases} x, & x \in (-\infty, 1] \\ -\frac{1}{2}(2-x)^2 + \frac{3}{2}, & x \in [1, 2] \\ \frac{3}{2}, & x \in [2, \infty) \end{cases}$$

4. (Continuation) Is the function in the preceding problem a cubic spline function?
5. Is the following function a natural cubic spline?

$$S(x) = \begin{cases} x^3 - 1, & x \in [-1, \frac{1}{2}] \\ 3x^3 - 1, & x \in [\frac{1}{2}, 1] \end{cases}$$
