

**Math 781 Hw8**  
due Monday 10/24/2022.

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. Determine whether this is a quadratic spline function:

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

3. Determine whether this is a natural cubic spline:

$$f(x) = \begin{cases} 2(x+1) + (x+1)^3 & x \in [-1, 0]; \\ 3 + 5x + 3x^2 & x \in [0, 1]; \\ 11 + 11(x-1) + 3(x-1)^2 - (x-1)^3 & x \in [1, 2]. \end{cases}$$

4. Determine the values of  $(a, b, c)$  that makes the function

$$f(x) = \begin{cases} x^3 & x \in [0, 1]; \\ \frac{1}{2}(x-1)^3 + a(x-1)^2 + b(x-1) + c & x \in [1, 3] \end{cases}$$

a cubic spline. Is it a natural cubic spline?