

## MAE384 Homework 4

1. The set of the following 4 data points is given:

$x$	$y$
0	1
1	6
2	25
3	76

(a) Perform interpolation by determining the 3rd order polynomial that passes through the points, using Lagrange interpolation method. Show your procedure, including the detail of the **Lagrange functions** used in the intermediate steps. Use the result to determine the value of  $y$  at  $x = 1.5$ . **2.5 points**

(b) Make a plot of (i) the original data points, (ii) the 3rd order polynomial obtained in (a) that passes through all the data points, and (iii) the four **Lagrange functions** that are used in (a). (Plotting (i) and (ii) together should demonstrate that your answer to (a) is correct.) **0.5 point**

*Note: If you choose to solve (a) by Matlab, please provide not only the Matlab codes but also the detail of the **Lagrange functions** that are used in the intermediate steps.*

2. The set of the following 4 data points is given:

$x$	$y$
0.5	0.5
2	1.5
3	2
5	1.2

(a) Determine the quadratic splines that fit the data. Show your detailed procedure except for the step of solving the matrix equation, which can be done with the **a\b** command of Matlab (or other means as you see fit) without detail.

**4 points**

(b) To demonstrate that you have obtained the correct answer, plot your splines along with the original data points in one figure, in the fashion of the figure in Example 5-7 (p. 215) in the textbook.

**1 point**