

Computing for Scientists - Lab 7

CS 1340 — Dr. Mihail
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1 Problem 1

Write **one** script that solves all the linear systems below, in order.

$$1 \quad \begin{cases} 5x_1 - 3x_2 + 2x_3 = 3 \\ 2x_1 + 4x_2 - x_3 = 7 \\ x_1 - 11x_2 + 4x_3 = 3 \end{cases}$$

$$2 \quad \begin{cases} x_1 + 4x_3 = 13 \\ 4x_1 - 2x_2 + x_3 = 7 \\ 2x_1 - 2x_2 - 7x_3 = -19 \end{cases}$$

$$3 \quad \begin{cases} -2x_1 + x_2 = -3 \\ x_1 + x_2 = 3 \end{cases}$$

$$4 \quad \begin{cases} 10x_1 - 7x_2 = 7 \\ -3x_1 + 2x_2 - 6x_3 = 4 \\ 5x_1 + x_2 + 5x_3 = -19 \end{cases}$$

$$5 \quad \begin{cases} x_1 + 4x_2 - x_3 + x_4 = 2 \\ 2x_1 + 7x_2 + x_3 - 2x_4 = 16 \\ x_1 + 4x_2 - x_3 + 2x_4 = -15 \\ 3x_1 - 10x_2 - 2x_3 + 5x_4 = -15 \end{cases}$$

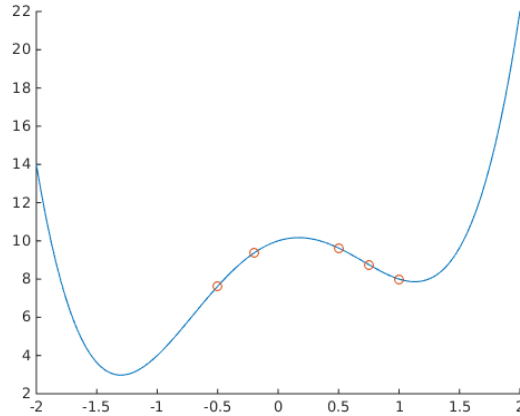


Figure 1: 4th degree polynomial

2 Problem 2 - curve fitting

You are given 5 data points sampled from a fourth degree polynomial.

$$f(x) = a_0 + a_1x^1 + a_2x^2 + a_3x^3 + a_4x^4$$

This polynomial (and the data points) are shown in Figure 1.

Given the following data points:

x	$f(x)$
-0.5	7.625
-0.2	9.3632
0.5	9.625
0.75	8.7578
1	8

solve for the polynomial's coefficients $(a_0, a_1, a_2, a_3, a_4)$. You have to formulate this curve fitting problem as the solution to a linear system of equations. Write a MATLAB script and use the matrix left division method.

Due dates

Problem 1 due at the end of class. Problem 2 due before midnight, Friday November 11th.