

MATH 3940-1 Numerical Analysis for Computer Scientists

Problem Set 5: Least Squares Approximations

Note: You can use Octave or Matlab for the questions that says to use Matlab.

1. Consider the data

x_i	1	2	3	4	5
y_i	1.4	2	2.3	3	3.4

Find the least-squares line $f(x) = a_1x + a_0$ for the data and calculate the error.

2. Consider the data

x_i	-1	0	1	2	3
y_i	6.62	3.94	2.17	1.35	0.89

(a) Find the least-squares approximation $y = be^{ax}$ by data linearization method (the change of variable method) and calculate the error.

(b) Find the least-squares approximation $y = be^{ax}$ by nonlinear method using Matlab (Hint: Use Matlab built-in function to minimize error).

3. Consider the data

x_i	1	3	5
y_i	0.465	0.202	0.129

Find the least-squares approximation $y = \frac{1}{a_1x + a_0}$ by data linearization method (the change of variable method).

4. Suppose you have to find the least-squares approximation $y = \frac{x}{a_1 + a_0x}$

by data linearization method, what would be the change of variable formulas?