Numerical Analysis
Spring 2010

Program na09

Overview: Use least squares regression to fit data.

Introduction: Do section 3.4 problems l0, 13, and 16 pages 139-141. Each problem requires programmatic output and some interpretation.

Specifications:

You may use the module for polynomial fitting in the resources.

10. Compute linear, quadratic, cubic, and quartic least squares fitting polynomials and the corresponding deviations

$$\sigma = \sqrt{\frac{\sum_{i=0}^{n} (y_i - f(x_i))^2}{n - m}}$$

for the given data. Here *n* is the number of data points and *m* is the number of functions used in the model. (In the case of polynomials with *n+1 points*, *m = degree + 1*.) Output a table giving the degree of each model, its deviation, and the coefficients. Use the deviations and your eyes to decide which is the best model. Plot the data in one color and the best polynomial model in another, and print the coefficients of your choice of the best model.

13. Compute the coefficients for the least squares model of the type shown. Plot the data in one color and the model in another color. Printed output should include the form of the model, the coefficients, and the deviation.

16. Transform the data apropriately, and find an appropriate model for the data. Plot the points in one color, and the model in another color. Printed output should include the form of the model and the coefficients. Use the model to estimate the half life.