Introduction to Computational Physics

Matthias Jamin

(To be discussed on Friday, 6.6. and Tuesday, 10.6.)

EXERCISE 4.1: **Cubic Spline Interpolation**
With the cubic-spline interpolation algorithms `spline` and `splint` given on the CP web page, calculate the interpolating function values of the tabulated function `spline.dat` at all mid-points of the x values $x_n = 0.631 + 0.002\,n$ where $n = 1, \ldots, 1184$.

Improve the `splint` algorithm for the sequential calls with ordered x values.

Plot the combined data sets to verify that the interpolation is smooth.

EXERCISE 4.2: **Linear χ^2 fit**
With the algorithm `fit` for the linear χ^2 fit given on the CP web page, fit the data set given in `linearfit.dat` and calculate the corresponding parameters a and b as well as their respective standard deviations σ_a and σ_b.

Calculate the correlation coefficient $r_{ab} = \mathrm{Cov}(a,b)/(\sigma_a \sigma_b)$.

Perform the same fit without using the information on the errors of the individual data points.

Plot both the data and the obtained fits.