The Bessel function of the first kind

Morten Kuhlwein

Exercise 25

In this exercise the Bessel function of the first kind of integer index is implemented. For this purpose the integral representation of the Besselfunction is used:

$$J_n(x) = \frac{1}{\pi} \int_0^{\pi} \cos\left(nt - x\sin(t)\right) \mathrm{d}t. \qquad (1)$$

Given an integer index n, and a value x, the value of $J_n(x)$ can be found by solving the integral. For this purpose the numerical integration routines from the Gnu Scientific Library is used.

The Bessel functions for the integer indexes $n = 1, 2$ and 3 found using this method can be found on figure 1, along with values calculated using the built-in Bessel functions from <math.h>.
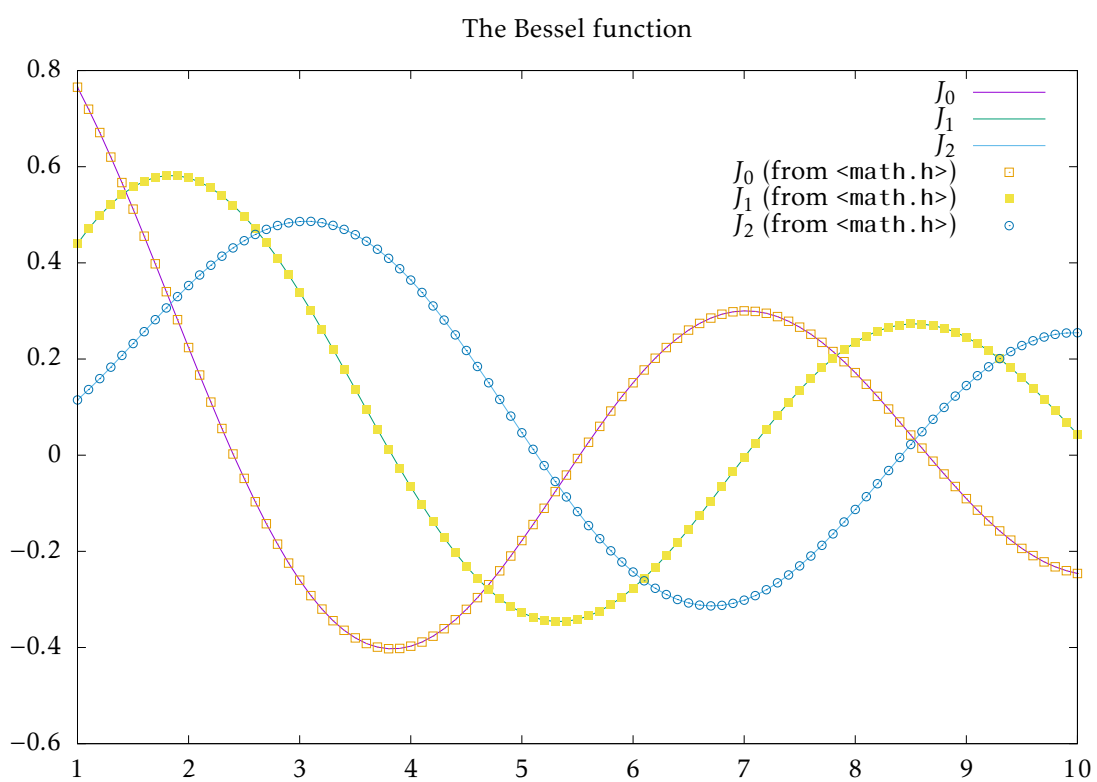
Figure 1: Comparison of the calculated Bessel functions and the functions from `<math.h>`.