The Bessel function of the first kind

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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:

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

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>`.

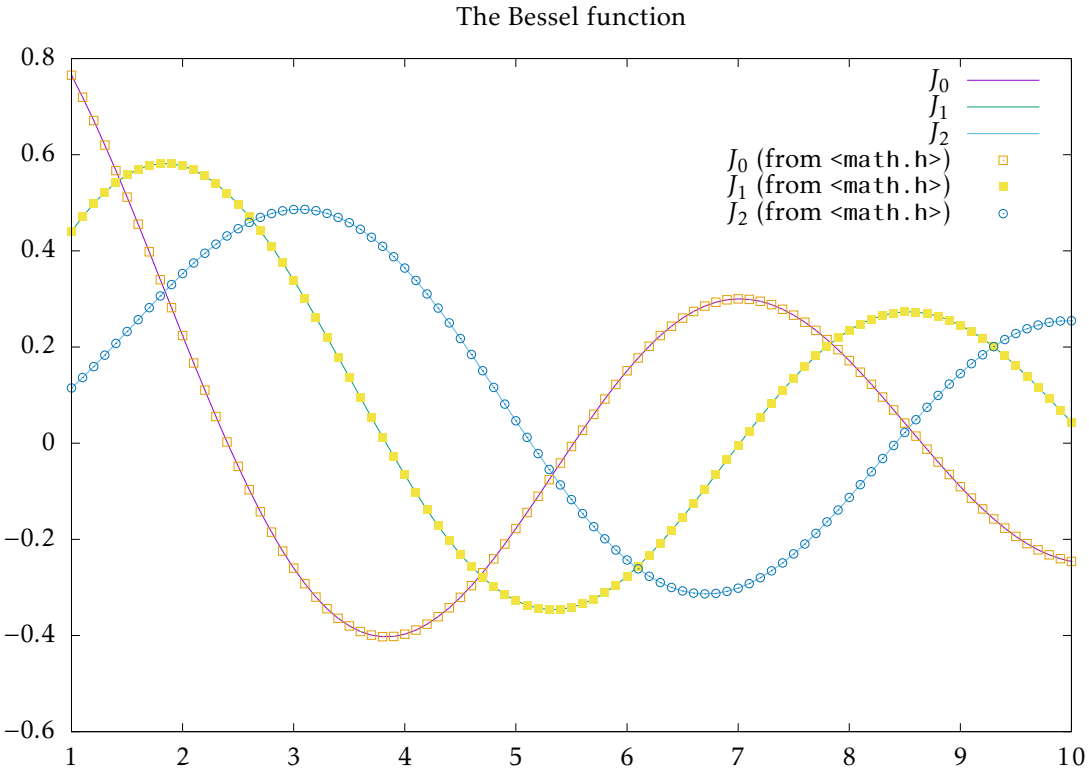

Figure 1: Comparison of the calculated Bessel functions and the functions from <math.h>.