

Exercise 2
Numerisches Praktikum – Numerical Practical Training
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Interpolation

Return by 9:15 a.m. Feb 21st as .pdf by Mail to: cecil@mpia.de

- **Exercise 1, 10 points:** Newton's Divided Differences for known polynomial

Write a program that computes the Newtonian divided differences for five points (i.e. up to the fourth divided difference should be used). To test your program, use the polynomial $y = f(x) = 0.1x^4 - x^2$ to compute 5 pairs of points (x, y) , ($x = 0, 0.3, 13.0, -4.8, -9.0$) and compare the original polynomial with the interpolation polynomial by plotting their values (and check the difference).

- **Exercise 2, 10 points:**

Use your program up to the third divided difference to obtain a fitting polynomial for the four points given (motion of the S2 star in the galactic centre). Compare its results with the direct interpolation polynomial derived in the lecture.

The data points to be used are (1,1500), (2,1000), (3,800), (4,700), in units of years and km/s. They are approximately taken from the following plot of measurements obtained by Gillessen et al. (2008), with the year 1 defined as the mid-point between 2003 and 2004.

