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Exercises 2(c) and 3 are to be handed in on Thursday, 16.12.2010, before the lecture.

Exercise 1 (Polynomial Interpolation)

The recorded report for Munich on the 6th of December 2010 showed the following values for the relative humidity:

Time	10 am	12 pm	2 pm	4 pm	6 pm
Relative Humidity	84%	91%	75%	68%	77%

What degree do you expect for the interpolating polynomial for these data? Use the Matlab functions *polyfit* and *polyval* to interpolate and plot your result.

Exercise 2 (Polynomial Interpolation)

(a) Interpolate the function $f(x) = sin(2\pi x)$ on the interval $[-1,1]$ by considering 20 equally spaced nodes $x_1, \ldots, x_{20}$ (use polynomial interpolation).

(b) Now, multiply $y_{10} = f(x_{10})$ by $(1 + 10^{-2})$ and interpolate this perturbed data again.

(c) Plot your results and compare them.

Exercise 3 (Chebyshev interpolation)

(a) Use linear transformation to scale the Chebyshev nodes from the interval $[-1,1]$ to an arbitrary interval $[a,b]$.

(b) Consider Runge's function $f(x) = \frac{1}{1+x^2}$ on the interval $[-5,5]$.
Compare the interpolation error (in the $\|.\|_\infty$-norm) of equally spaced nodes to Chebyshev nodes (scaled to $[-5,5]$, see (a)) for $n = 5,\ 10,\ 20,\ 40$, where n denotes the number of nodes (use Matlab).
You may approximate the $\|.\|_\infty$-norm of a function g by
$\|g\|_\infty \approx max\{|g(a_i)| : a_i = -5 + \frac{i}{100},\ i = 0, \ldots, 1000\}$.