Numerical Algorithms

Winter Semester 2015
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Exercise Sheet 0.   Due date: **Tuesday, 3.11.15**.

The objective of this exercise sheet is to get familiar with the Scientific Computing Tools for Python (Scipy). Installation instructions for Linux, Mac-OS and Windows can be found in:

http://www.scipy.org/install.html

Computers with Scipy installed are available in the terminal room located at Wegelerstraße 6, room 6.012. An excellent tutorial to get started with Scipy is the following:

http://www.scipy-lectures.org/

Chapter one covers all we need for the exercises.

Programming Exercise 1. (Hands on SciPy)

a) Write a function that displays the first n terms of the sequence defined by

$$C_0 := 1, \quad C_{n+1} = \frac{4n+2}{n+2}C_n. \tag{1}$$

b) Write a program which takes an integer n as argument and returns the $n \times n$ matrix H_n, whose (i,j) entry is given by C_{i+j-2}.

c) Get plots of the determinant and condition number of the matrix H_n as a function of n, for $n = 1, \ldots, 15$. (See `scipy.linalg` and `numpy.linalg`)

(4 points)