Faculty of Mathematics
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Magdeburg, 02.11.2003

Exercises to the classes
Numerical Methods in Sciences and Technics

Exercises no. 5

to 17.11.2003

The solution of exercise 1 is to submit in the exercise classes on Monday, 17.11.2003 !

Statements given in the lecture can be used in the solution of the exercises without proof. All other statements have to be proved.

1. Write a matlab script for a coarse grid correction scheme applied to the model problem. The smoother should be the damped Jacobi iteration with damping factor ω. The input parameters of the coarse grid correction scheme should be

   - the number of intervals on the fine grid N (even positive integer),
   - the damping factor ω.

   Solve the model problem with $f = 0$ ($\Longrightarrow$ solution is $u = 0$) for different N and $\omega = 0.5$ using the initial iterate

   $$u^0(x) = \sin(\pi\ x) - 6\sin(7\pi\ x) + 12\sin(64\pi x).$$

   (Take the values of $u^0(x)$ in the nodes of the grids to define the initial vector u^0). Stop the coarse grid correction scheme if the l^2-norm of the residual is less than 10^{-10}. Count the number of iteration for achieving this accuracy and present a table with the results.