

Department for Mathematics and Computer Science  
Free University of Berlin  
Prof. Dr. V. John, john@wias-berlin.de  
Hanne Hardering, harderin@zedat.fu-berlin.de

Berlin, 17.06.2013

## Numerical Mathematics III – Partial Differential Equations

### Exercise Problems 09

**Attention:** The approach for getting a solution has to be clearly presented. All statements have to be proved, auxiliary calculations have to be written down. Statements given in the lectures can be used without proof.

1. Show the estimate given in Lemma 6.4 for  $p = \infty$ ,  $k = 0$ , and  $l = 1$ . Start with the estimate (6.2), i.e., with

$$|v(\mathbf{x})| \leq \frac{2R}{|\Omega|} \int_{\Omega} \int_0^1 \|\nabla v(t\mathbf{x} + (1-t)\mathbf{y})\|_2 dt d\mathbf{y}.$$

2. Finish the finite element code from Exercise Problems 08.

The exercise problems should be solved in groups of two or three students. They have to be submitted until **Tuesday, June 25, 2013** either before or after one of the lectures or directly at the office of Mrs. Hardering. The executable codes have to be send by email to Mrs. Hardering.