



University of Houston  
Department of Mathematics  
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Numerical Partial Differential Equations



## Numerical Partial Differential Equations (Homework 5)

### Exercise 8 (*L-shaped domain*)

Solve the elliptic boundary value problem from Exercise 6 by continuous, piecewise linear finite elements with respect to a uniform simplicial triangulation  $\mathcal{T}_h(\Omega)$  of  $\Omega$  by right isosceles triangles for  $h = 1/16, 1/32, 1/64, 1/128, 1/256$  ( $h$  length of sides).

**Required output:** Provide a table of your numerical results of the form

$h$	$ e_h _{1,\Omega}$	$\ e_h\ _{0,\Omega}$	$\ e_h\ _\infty$
$\frac{1}{16}$			
$\frac{1}{32}$			
$\frac{1}{64}$			
$\frac{1}{128}$			
$\frac{1}{256}$			

where  $e_h := u - u_h$  stands for the global discretization error and  $|\cdot|_{1,\Omega}$ ,  $\|\cdot\|_{0,\Omega}$ ,  $\|\cdot\|_\infty$  refer to the  $H^1$ -seminorm,  $L^2$ -norm, and  $L^\infty$ -norm, respectively.

Further, provide plots of the exact solution and the approximate solutions.

**12 Points**

The exercise is due on March 26, 2008. The homework may be submitted either electronically (rohop@math.uh.edu) or as a hardcopy in class