

Homework Problems
Due Monday, February 16, 2009

Problem 1 *Problem 14.1. Here what is required are inequalities going both ways, relating the radius of the inscribed circle and the minimum angle of the triangle.*

Problem 2 *Use the finite element method with the B-splines of order 2, 3, 4 and the number of grid points N equal to 10 and 20 to find approximate solutions to*

$$-((1+x)u')' = 25x \text{ on } [0, 1] \text{ with } u(0) = u(1).$$

The exact solution of this problem is:

$$u(x) = \frac{25x}{2} - \frac{25x^2}{4} - \frac{25 \ln(1+x)}{4 \ln(2)}.$$

In each case letting $\hat{u}(x)$ denote the finite element solution, compute the error

$$\sqrt{\int_0^1 |u(x) - \hat{u}(x)|^2 dx},$$

and the error

$$\sqrt{\int_0^1 |u'(x) - \hat{u}'(x)|^2 dx}.$$