

AMSC/CMSC 661 Quiz 2 , Spring 2005

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. During the quiz you may use your textbook, my notes, and your own notes. No communication with others and no calculators or other electronic devices are permitted.

Name _____

- 1a. (3) Write the definition of $|u|_{C^2(\bar{\Omega})}$ when the domain is $\bar{\Omega} = [0, 1]$.
1b. (7) Prove that for $x \in \bar{\Omega}$ and $u \in C^2(\bar{\Omega})$,

$$\left| u'(x) - \frac{u(x+h) - u(x)}{h} \right| \leq Ch|u|_{C^2(\bar{\Omega})}.$$

2. Consider the problem

$$-u'' + \pi u = f \text{ on } \Omega = (0, 1)$$

with boundary conditions $u'(0) = u'(1) = 0$.

- a. (5) Write the weak formulation. (Use test functions $v \in H^1$.)
- b. (5) Show that if $u \in C^2(\bar{\Omega})$ and u solves the weak formulation, then u solves the differential equation and satisfies the boundary conditions.