Homework 6

Due: Dec. 30 2024

1. Read Chapter 4 from page 188 to 192 on the standard error estimates in Sobolev norm. Make sure you understand the meaning of the estimate. Do the following exercises.

- Exercise 3 on page 190
- Exercise 4 on page 190

2. Work on the 2D Matlab code developed in class.

a. Modify the code to enable the calculation with linear triangles. You may subdivide each quadrilateral element into two triangle elements to generate the mesh data.

b. Design a manufactured solution for the problem. Develop an error calculator for the error function $e = u^h - u$ measured in the Sobolev norms $\|e\|_0$ and $\|e\|_1$. Use the standard error estimate to verify the correctness of the code by observing the convergence rate. You need to report the error against the mesh size in a log-log plot. You need to this for both quadrilateral element and triangle element.

3. Read the file `quarter-plate-with-hole-quad.geo', which is stored on the class github repository. Add comments to each line and explain the meaning of the file. Submit your commented geo file.