PROJECT 1: STOKES EQUATION

Choose one of the stable finite element pairs for approximating Stokes equation and verify the convergent rate.

To test the convergence, you can construct a simple exact solution to the Stokes equation by the following setting:

- $g = 2^8(x - x^2)^2(y - y^2)^2$;
- $\boldsymbol{f} = -\boldsymbol{\Delta}\,\mathbf{curl} g - \nabla g_{xx}$;
- $\boldsymbol{u} = \mathbf{curl} g, p = -g_{xx}$.

Suggestions on the project (you don't have to follow).

(1) Write out basis functions and form the matrix in one triangle;
(2) Assemble global matrix by a loop over all triangles;
(3) Test your discretization for Poisson equation first;
(4) Then test the Stokes equation.

If you choose quadratic elements or non-conforming elements, I have some codes available (but not test yet). Contact me if you need it.