Homework 3
Math 270A

• **Problem 1.** Write a discrete Poisson solver using the multigrid handout code for the periodic problem

\[-\Delta p = 8\pi^2 \sin(2\pi x)\cos(2\pi y), \quad (x, y) \in [0, 1] \times [0, 1].\]

Run your code for $N = 160$ and compare against CG by plotting the maximum residual (in absolute value) as a function of the iteration (v-cycle iteration of CG iteration). Hint, MG should be much faster :)

• **Problem 2 (Extra Credit).** Do problem 5 from the last assignment, but use marker particle visualization and MG instead of CG.

• **Problem 3 (Extra Credit).** Use tether and elastic forces to run problem 3 from the first assignment but in an incompressible Euler fluid using solid/fluid coupling.