

Lab 3

These are just exercises, do not hand them in as homework.

1. For tutorial step-4:
 - (a) Change the boundary values and the geometry to an L-shape. Visualize the output in VisIt.
 - (b) Write a function that prints the number of hexs, quads, and lines in 3d, and only the number of quads and lines in 2d (printing hexs doesn't make sense). You might need template specialization to do this.
 - (c) Run the program with different global refinement levels (3,4,5), check if the numbers make sense.

2. tutorial step-6:
 - (a) Read the introduction.
 - (b) Switch to vtk output (in the DataOut not the GridOut part).
 - (c) Output solution without the call to `constraints.distribute()`. What happens?
 - (d) Change the fraction of the number of cells to be refined.

3. Constraints:
 - (a) Create a mesh with hanging nodes like in lecture (7 cells, two hanging nodes).
 - (b) Print the ConstraintMatrix (Q1 elements, you should get 2 constraints).
 - (c) Print the sparsity pattern, once with `keep_constrained_dof = false`, once = `true`.
 - (d) Print the system matrix.
 - (e) Now take a look at the ConstraintMatrix with Q2 elements, why is there a constraints $x_i = x_j$?