Note: Unless specifically asked to submit a solution, just work on the exercises and keep track of your progress in your journal.

- 1. Make yourself familiar with step-6 (I added a copy of step-6 to the class github repository). The step-6 documentation is at https://www.dealii.org/current/doxygen/deal. II/step\_6.html. Go read it.
- 2. Visualize the solution once with the constraints.distribute() call in the code and once without (just comment this line out). In your hournal, describe in your own words what this call does.
- 3. Create a new function that creates the simple mesh with 7 cells and two hanging nodes as shown in class (refine a 2d hypercube once and then refine the first cell one more time). Create the AffineConstraints object with the hanging node constraints for a Q1 and a Q2 finite element and print to the screen (it should be 2 constraints for Q1).
- 4. Use the code

to create a map from DoF index to coordinates and confirm that the constrained DoFs are indeed the ones you expect them to be.

5. Now do the same for Q2 and **write down in your journal** what constraints you are seeing (as mathematical notation, not just the deal.II format). Can you create a simple sketch how the constraints look like? Can you explain the different kind of constraints?