

Homework assignment 5

September 23, 2019

To be handed in by 23:59 on Sunday October 5th. For all your coding exercises, I recommend that you use a Jupyter notebook which you can later export as PDF.

1. Explain the difference between residual and error. Relate this to solving the discrete problem and solving the continuous problem.
2. Implement a Poisson equation solver that solves the equations from Homework 4 Problem 3-4 using Jacobi iteration up to a tolerance of 10^{-6} .
3. What is the principle behind the multigrid method? Why is it better than using simple iterative solvers?
4. Implement a two-level multigrid solver that uses a V-cycle. Use it to solve the iterative problem from Question 2. Compare the rate of convergence of the multigrid method to the Jacobi iteration method for the same tolerance.