MSDM5004 Spring 2021

Homework 3 (Part II)

Due Apr. 11

5. Write a code using MATLAB (or some other software) to solve the following boundary value problem of the Poisson equation, using the five-point scheme and the Jacobi iteration method for solving the resulting linear system. Please a uniform square grid of size $\frac{1}{2}$.

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 2(x^2 + y^2 - 2), \quad -1 \le x \le 1, \ -1 \le y \le 1,$$

The boundary conditions are $u(\pm 1, y) = u(x, \pm 1) = 0$.

Warning: Please write your own code for the Jacobi iteration. No credit will be given if you directly use the available function for the Jacobi iteration in MATLAB or some other programming language/software.