

Math 104B Homework #5 *

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General Instructions: Please write your homework papers neatly. You need to turn in both your codes and descriptions on the appropriate runs you made by following TA's instructions. Write your own code, individually. Do not copy codes!

1. Consider the linear system of the boundary value problem of homework #4, i.e.

$$\frac{-v_{j-1} + 2v_j - v_{j+1}}{h^2} + \pi^2 v_j = 2\pi^2 \sin(\pi x_j), \quad \text{for } j = 1, 2, \dots, N-1, \quad (1)$$

where $h = 1/N$, v_j is the approximation to $u(x_j)$ for $j = 1, 2, \dots, N-1$, and $v_0 = v_N = 0$.

- (a) Implement Jacobi's iteration method to find an approximation of the solution to (1) using a stopping criterium of $\|b - Ax^{(k)}\| < 0.1h$, with $h = 1/N$. Do this for $N = 50$ and $N = 100$ and comment on the required number of iterations.
- (b) Repeat (a) for the Gauss-Seidal iteration.

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