

## MATH 131: Numerical Methods for scientists and engineers - Discussion 11: Paper

---

1. Show that if  $A$  is strictly diagonally dominant then  $\|M^{-1}N\|_{\infty} < 1$  for  $M, N$  from Jacobi's method.
2. Compute the eigenvalues and eigenvectors of the following matrix  $\begin{pmatrix} \frac{1}{2} & 0 & 0 \\ -1 & \frac{1}{2} & 0 \\ 2 & 2 & -\frac{1}{3} \end{pmatrix}$  and find the spectral radius.
3. Apply the two first iteration of Jacobi and Gauss-Siedel methods to the problem  $Ax = b$  with  $A = \begin{pmatrix} \frac{1}{2} & 0 & 0 \\ -1 & \frac{1}{2} & 0 \\ 2 & 2 & -\frac{1}{3} \end{pmatrix}$  and  $b = \begin{pmatrix} 1 \\ -1 \\ 3 \end{pmatrix}$ .
4. Help to review for the final:
  - (a) Make a table of all methods you learned to solve root-finding problems
  - (b) Make a table of all methods you learned to do numerical integration
  - (c) Make a table of all methods you learned to approximate initial value problems
  - (d) Make a table of all methods you learned to solve  $Ax = b$