1 10 Points

Let

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 3 & 1 \\ 1 & 1 & 4 \end{bmatrix}.$$

(a) Make codes which perform Power iteration, Shifted inverse iteration, Rayleigh Quotient Iteration, respectively.

(b) Using *eig* function in matlab, find eigenvalue and eigenvector of A.

(c) For given matrix A, using $v^{(0)} = (1,1,1)^T/\sqrt{3}$ as initial eigenvector estimate, find eigenvalue with three methods you coded in (a). (Choose ϵ-for example, 10^{-12}-such that stop your iteration if the $|\lambda^{(k)} - \lambda^{(k-1)}| < \epsilon$ and print $\lambda^{(k)}$). Compare convergence speed using iteration number. Also, print $\lambda^{(1)}, \lambda^{(2)}, \lambda^{(3)}$ for each method and compare the error with real eigenvalue from (b). Which method is better?

(d) Find all three eigenvalues of A, using three methods. Based on convergence speed, error with real eigenvalue from (b) and time for code, which method is better?