MATH 472 COMPUTING PROJECT # 4

April 13, 2018, Due April 19, 2018

Consider the matrix

$$A = \begin{bmatrix} -149 & -50 & -154 \\ 537 & 180 & 546 \\ -27 & -9 & -25 \end{bmatrix}$$

Part I Apply the stabilized power method to approximate the dominant eigenvalue and corresponding eigenvector of A.

(1) Start the iteration with $\mathbf{x^{(0)}} = (1, 1, 1)^T$.

(2) Stop the iteration when $|\rho_k - \rho_{k-1}| \leq 10^{-5}$ where ρ_k is the Rayleigh quotient

$$\rho_k = \frac{\mathbf{x^{(k)}}^T A \mathbf{x^{(k)}}}{\mathbf{x^{(k)}}^T \mathbf{x^{(k)}}}$$

(3) Print the number of iterations k, the Rayleigh quotient ρ_k and the corresponding eigenvector $\mathbf{x^{(k)}}$ at the end of the iteration.

Part II In this part, we use the Rayleigh Quotient iteration (see your class notes). Use the same starting vector and the stopping criterion of Part I. Which method is faster?