Lab Assignment – 7

1) Do the following operations in C/C++.
   a) Generate a random symmetric matrix of size $n \times n$, where n is input by the user.
   b) Save the matrix in a file (.txt) in the following format:
      Row index = 1 1 2 2
      Column index = 1 2 1 2
      Entry = 2 3 3 1
      The matrix will look like- $\begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix}$.
   c) Read the matrix from the file.
   d) Compute the dominant eigenvalue of the matrix by using Power method.
   e) Find all eigenvalues and corresponding eigenvectors of the matrix using QR method. Compare the highest eigenvalue computed by QR and Power method.
   f) Do the Singular value decomposition (SVD) of the matrix.
   g) Write the resultant matrices of SVD in another file.