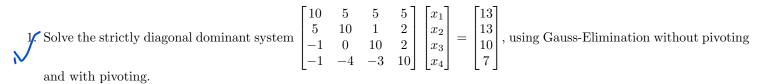
Assignment

Course title: Numerical Linear Algebra (MCO533), Credit points: 10% Instructor:Srinivasa Rao Pentyala, Email: psrao@iitism.ac.in

Instructions: Any preferred programming language C, C++, Python, MATLAB ... etc. and need to submit printed copy in the office Room No: 517, Science Block by 20/04/2023, 5:00 PM. Please make to include all comments along with sample input and output to increase the readability of the algorithm.



- 2. Apply householder transformation for the matrix $\begin{bmatrix} 0 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 1 & 1 \end{bmatrix}$, you may start with $u = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}^T$
- 3. Find QR factorization of $A = \begin{bmatrix} 10 & 1 & 1 & 1 \\ 2 & 10 & 1 & 1 \\ 1 & 1 & 10 & 1 \\ 1 & 1 & 1 & 10 \end{bmatrix}$ by given's method.
- 4. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 6 \end{bmatrix}$ compute the eigenvalues of A, take $E = 10^{-4}a \times I_{3\times3}$, then compute Eigenvalues of A + C.
- 5. Given two real symmetric matrices A and B by $A = \begin{bmatrix} 6 & 4 & -2 \\ 4 & 12 & -4 \\ -2 & -4 & 13 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 1 \\ -1 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ determine a non-singular matrix P, such that $P^TAP = I$.
- 6. Find the SVD of $A,\,U\Sigma V^T,$ where $A=\begin{bmatrix} 3 & 2 & 2 \\ 2 & 3 & -2 \end{bmatrix}$
- 7. Find QR of A, where $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$
- 8. Compute a basis for the null space of the matrix Find, where $A = \begin{bmatrix} 1 & -1 & 1 & 2 \\ 2 & 1 & 3 & 2 \\ 1 & 5 & 3 & -2 \end{bmatrix}$
- 9. For the Hessenberg System AX = B where $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 5 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 6 \\ 9 \\ 11 \end{bmatrix}$, using partial pivoting compute the growth factor.
- 10. Construct QR factorization using Householder method for the matrix where $A = \begin{bmatrix} 1 & 1 \\ 0.0001 & 0 \\ 0 & 0.0001 \end{bmatrix}$