**PES University, Bangalore**

**UE18MA251- Linear Algebra (Jamuna S Murthy)**

**Session: Jan 2020 – May 2020**

## Scilab Assignment 4

1. Write a Sci-Lab Program to implement the Gram- Schmidt Orthogonalization in $R^3$.

   **Procedure:** Given a set of mutually independent vectors a , b, c in $R^3$, we produce a set of orthonormal vectors $q_1$, $q_2$, $q_3$ by applying the Gram – Schmidt process.

2. Write a Sci-Lab Program to find the Eigen values and Eigen vectors of any square matrix of size 3*3.

   **Procedure:** Given a square matrix A, we find the characteristic polynomial of A by expanding the matrix equation $| A - \lambda I |$. The Eigen values of A are obtained solving the characteristic equation $| A - \lambda I | = 0$. The corresponding Eigen vectors are obtained by solving the system of equations $Ax = \lambda x$.

3. Write a Sci-Lab Program to find the numerically Largest Eigen value of A using Rayleigh Power Method for any 3*3 matrix.

   **Procedure**: Given a square matrix A and an initial vector $x_0$, to find the numerically largest Eigen value of A, we compute the product $Ax_0$ and rewrite it in the form $\lambda_1 x_1$ where $\lambda_1$ is the first approximation to the numerically largest Eigen value $\lambda$ and $x_1$ is the corresponding Eigen vector which is the first approximation to the actual Eigen vector. We then find $Ax_1$ and rewrite it in the form $\lambda_2 x_2$. This process is continued until we get the two successive values of $\lambda$ to be nearly the same.

Deadline: 5th April 2020