[Summary]

[Eigenvalues and Quadratic Forms]

Subject:	Business Economics
Course:	B.A., 6th Semester, Undergraduate
Paper No. & Title:	631 (Six Three One) Advanced Mathematical Techniques
Unit No. & Title:	Unit - 1 Linear Algebra
Lecture No. & Title:	1 (One) Eigenvalues and Quadratic Form

Summary:

Let A be a square matrix of order n. A real number λ is called an eigenvalue of the matrix A if there exists a non-zero (column) vector $x = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}$ in $\mathbb{R}^n$ satisfying $Ax = \lambda x$ The vector x is called an eigenvector of the matrix A associated to the eigenvalue λ.

It is not difficult to realise that eigenvalues of a matrix A are simply the roots of the equation $|A - \lambda I| = 0$. So computation of eigenvalues of a given square matrix of order n simply involves determining the roots of a n^{th} degree polynomial $|A - \lambda I|$. Eigenvalues and eigenvectors are usually studied from the theoretical perspective only but the motivation behind the study of these concepts is perhaps, their numerous applications in the study of various mathematical, statistical and economic models. One of the applications of eigenvalues that is related to determining the sign of a quadratic form which arises through a second-order condition for local maximalist or minimalist of a multivariate function is discussed in this module.