MATHEMATICAL METHODS FOR ECONOMICS

Unit 1: DIFFERENCE EQUATION

1. Meaning of Difference equation

A difference equation is used to solve the values of an unknown function y(x) for different discrete values of x. We obtain a function y(x) such that it satisfies the equation for all values of x.

2. How Difference equations differ from Differential equations?

Both are exactly analogous with the only difference that difference equation is applied when the only discrete values, whereas differential equation is applied when independent variable takes continuous values.

3. Difference equations in Economics.

A difference equation of order m in a time dependent variable X_t is an equation of the form

$$F= (t, X_t, X_{t-1}\ldots\ldots\ldots X_{t-m}) =0, \text{ where F is a function}$$

In other words, the f function relates the state variable at time t to its m number of previous values.

4. Order of Difference Equation

The order of a difference equation is the difference between the largest and the smallest time subscript appearing in the equation.

5. Linear Difference Equation

A difference equation is said to be linear if F is a linear function of the state variables.

6. Autonomous Difference Equation

A difference equation is said to be autonomous if the time variable 't' does not enter as a separate argument in the f function.