Definition(8): Moment generating function

The moment-generating function of the r.v. X is defined, if the mathematical expectation exists, by

$$M_x(x) = E[e^{tx}]$$

Chapter Two : Stochastic Processes(S.P)

The Theory of Stochastic Processes is generally defined as the "dynamic" Part of probability theory, in which one studies a collection of random variables (Called a stochastic Process) from the point of view of their interdependence and limiting behavior.

The theory of stochastic processes deals with systems which develop in time or space in accordance with probabilistic laws. Applications of the theory can be made to a wide range of phenomena in many branches of science and technology.

The stochastic processes has many applications in diverse fields such as statistical physics, management science(operations research), communication and control theory, and time series analysis. And other applications in astronomy, biology, industry and medicine.

In operations research two fields in which the theory of stochastic processes has found are inventory control and waiting-line(Queues) analysis.

2.1 Definition of stochastic processes

A stochastic process is a family of random variables X_t where t is a parameter running over a suitable index set T. We will write X(t) as a process instead of X_t.

In a common situation, the index t corresponds to discrete units of time, and the index set is T = {0, 1, 2, . . .}.