DELHI TECHNOLOGICAL UNIVERSITY



STOCHASTIC PROCESSES

(MC-303)

PRACTICAL FILE

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EXPERIMENT 5

# AIM

WAP to find the expected waiting time until the nth renewal in case of a renewal process with renewal cycle length distributed

(a) normally with mean μ and standard deviation σ,

(b) exponentially with parameter λ

Demonstrate it by taking suitable values for (a) and (b) both

# THEORY

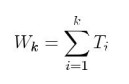
A Renewal process is a general case of a Poisson Process in which the inter-arrival time of the process or the time between failures does not necessarily follow the exponential distribution. A counting process N(t) that represents the total number of occurrences of an event in the time interval (0, t] is called a renewal process, if the time between failures are independent and identically distributed random variables.

The probability that there are exactly n failures occurring by time t can be written as,





Note that the times between the failures are T1, T2, …, Tn so the failures occurring at time Wk are,



## SOURCE CODE

function [answer] = renewal\_normal\_process(mu, sigma, n)

answer = n\*mu;

fprintf('Expected waiting time till the %d th renewal: ',n);

end

function [answer] = renewal\_erlang\_process(lam, n)

answer = n/lam;

fprintf('Expected waiting time till the %d th renewal: ',n);

end

## OUTPUT

