UNIT-V: Continuous Probability Distributions

Author : Generated by AI **Date :** 2025

Continuous Probability Distributions

A probability distribution where the random variable can take any value within a given range.

Uniform Distribution

A distribution where all outcomes are equally likely.
Formula: f(x) = 1 / (b - a), for a ≤ x ≤ b.

Exponential Distribution

Used to model time between events in a Poisson process.
Formula: f(x) = λe^(-λx), for x ≥ 0.

Gamma Distribution

Generalizes the exponential distribution to model waiting times for multiple events.
Formula: f(x) = (λ^k * x^(k-1) * e^(-λx)) / (k-1)!.

Weibull Distribution

Used in reliability analysis and failure modeling.
Formula: f(x) = (β/α) * (x/α)^(β-1) * e^(-(x/α)^β).

Normal Distribution

A symmetric, bell-shaped distribution describing many natural phenomena.
Formula: f(x) = (1 / (σ√(2π))) * e^(-(x - μ)^2 / (2σ^2)).

Functions of a Random Variable

Transformations of random variables to derive new distributions and probabilities.