Summary

- A random variable X is said to follow normal distribution with parameters μ and σ^2 if its pdf is given by, $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}, -\infty < x < \infty, -\infty < \mu < \infty, \sigma > 0$
- When a random variable is normally distributed with mean μ and standard deviation σ, it is customary to write X is distributed as N(μ, σ^2) and is expressed by X~ N(μ, σ^2)
- If X~ N(μ, σ^2), then Z=(X-μ)/σ is a standard normal variate with E(Z)=0 and V(Z)=1 and we write Z~N(0,1)
- The graph of f(x) is a famous bell-shaped curve. The top of the bell is directly above the mean μ.
- Binomial distribution, which is discrete, tends to normal distribution under the following conditions.
    - n, the number of trials is indefinitely large, i.e. n→∞
    - Neither p nor q is very small
- Poisson distribution tends to normal distribution when the parameter λ→∞
- Gamma distribution tends to normal distribution for large values of α.
- For normal distribution Mean=Median=Mode=μ.
- Mgf of normal variate is $e^{t\mu + t^2\sigma^2/2}$ and mgf of standard normal variate is $e^{t^2/2}$
- Cgf of normal variate is $= t\mu + t^2\sigma^2 / 2$
- Normal distribution is symmetric and has normal curve or mesokurtic curve.
- For normal distribution, all odd order moments about mean vanish and even order moments about mean is given by $[1.3.5....(2n-1)]\sigma^{2n}$
- The points of inflexion of the normal curve are given by μ±σ
- For a normal distribution, we know that mean=median=mode=μ. Hence, mean deviation at μ is given by $MD = \sigma\sqrt{\frac{2}{\pi}} = \frac{4}{5}\sigma(approx.)$
- Let X_i, i=1, 2 … n be n independent normal variates with mean μ_i and variance σ_i^2 respectively. Then, $\Sigma a_i X_i \sim N(\Sigma a_i \mu_i, \Sigma a_i^2 \sigma_i^2)$