Poisson Distribution :

$p(y) = \frac{\lambda^y}{y!} e^{-\lambda}$

Tchebysheff's Theorem :

$P(|Y - \mu|) < k\sigma) \geq 1 - \frac{1}{k^2}$

or

$P(|Y - \mu|) \geq k\sigma) \leq \frac{1}{k^2}$

Probability Distribution for a Continuous Random Variable :

$$E(Y) = \int_{-\infty}^{\infty} yf(y)\, dy$$

Uniform Probability Distribution

$$\mu = E(Y) = \frac{\theta_1 + \theta_2}{2}$$

$$\sigma^2 = V(Y) = \frac{(\theta_2 - \theta_1)^2}{12}$$

Exponential Distribution

$$\mu = \frac{1}{\lambda}$$

$$V(Y) = \frac{1}{\lambda^2}$$

$$f(x) = \lambda e^{-\lambda x},\ for\ x \geq 0$$

Bivariate Distribution

$$p(y1, y2) = P(Y1 = y1, Y2 = y2),\ -\infty < y1 < \infty, -\infty < y2 < \infty$$

Continuous Random Variables with Joint Distribution Function

$$F(y1,\ y2) = \int_{-\infty}^{y1} \int_{-\infty}^{y2} f\ (t1,\ t2)\ dt2\ dt1$$

Marginal Probability and Density Functions

$$p1(y1) = \sum_{all\ y2} p(y1,\ y2)\ and\ p2(y2) = \sum_{all\ y1} p(y1,\ y2)$$

$$f1(y1) = \int_{-\infty}^{\infty} f\ (y1,\ y2)\ dy2\ and\ f2(y2) = \int_{-\infty}^{\infty} f\ (y1,\ y2)\ dy1$$

$$p(y1|y2) = P(Y1 = y1|Y2 = y2) = P(Y1 = y1, Y2 = y2) = p(y1,\ y2),\ P(Y2 = y2)\ p2(y2)$$

$$F(y1|y2) = P(Y1 \leq y1|Y2 = y2)$$

$$f(y1|y2) = f\frac{(y1,y2)}{f2(y2)}$$

$$f(y2|y1) = f\frac{(y1,y2)}{f1(y1)}$$

Independent Random Variables

$$F(y1,\ y2) = F1(y1)F2(y2)$$