# Variance

1. Variance: $Var(X) = E[(X-\mu_X)^2] = E[X^2] - (\mu_X)^2 = E[X^2] - [E(X)]^2$.

$sd(X) = \sqrt{Var(X)}$

1) $X \sim Bernulli(\theta)$. $Var(X) = \theta(1-\theta)$.

2) $X \sim Binomial(n, \theta)$, $Var(X) = n \cdot \theta \cdot (1-\theta)$.

3). $X \sim Geometric(\theta)$, $Var(X) = \frac{1-\theta}{\theta^2}$.

4) $X \sim Poisson(\lambda)$. $Var(X) = \lambda$.

5). $X \sim Uniform[L, K]$. $Var(X) = \frac{(K-L)^2}{12}$

6). $X \sim Exponential(\lambda)$. $Var(X) = \frac{1}{\lambda^2}$

7). $X \sim Normal(\mu, \sigma^2)$. $Var(X) = \sigma^2$.

8). $Var(aX+b) = a^2 Var(X)$.

2. Suppose. $X, Y$ are independent.

1) $Var(X+Y) = Var(X) + Var(Y)$

2) $Sd(X+Y) = \sqrt{Sd(X)^2 + Sd(Y)^2}$