$\bar{x} = \frac{\Sigma_{i=1}^{n} x_i}{n}$ $s^2 = \frac{\Sigma_{i=1}^{n}(x_i - \bar{x})}{n-1}$

$P(A^c) = 1 - P(A)$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{P(B|A)P(A)}{P(B|A)P(A)+P(B|A^c)P(A^c)}$

Discrete Random Variables

Let X be a discrete random variable with a pmf of $p(x)$ then

$$E[X] = \sum_x xp(x)$$

Let X be a random variable, then

$$Var(X) = E[X^2] - E[X]^2$$

Linear combination of random variables X and Y and fixed numbers a and b:

$$E[aX + bY] = aE[X] + bE[Y]$$
$$Var(aX + bY) = a^2Var(X) + b^2Var(Y)$$

Distribution	**pmf**	$E(X)$	$Var(X)$
Binomial	$\binom{n}{k}p^k(1-p)^{n-k}$	np	$np(1-p)$
Geometric	$(1-p)^{n-1}p$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Discrete Uniform	$\frac{1}{n}$	$\frac{a+b}{2}$	$\frac{(b-a+1)^2-1}{12}$
Poisson	$\frac{\lambda^k}{k!}e^{-\lambda}$	λ	λ

Continuous Random Variables

$$E[X] = \int_{x \in \Omega_x} xf(x)\,dx$$