Useful Formulas

	Discrete Case	**Continuous Case**
$P(a \le X \le b)$	$\sum_{i:a \le x_i \le b} P(X = x_i)$	$\int_a^b f(x)\,dx$
$\mu = E[X]$	$\sum_i x_i P(X = x_i)$	$\int_{-\infty}^{\infty} x f(x)\,dx$
$\sigma^2 = \mathrm{Var}(X)$	$\sum_i (x_i - \mu)^2 P(X = x_i)$	$\left(\int_{-\infty}^{\infty} x^2 f(x)\,dx\right) - \mu^2$

Distribution	**Probability Density Function**	$E[X]$	$\mathrm{Var}(X)$
Binomial(n, p)	$P(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$ for $k = 0, 1, \ldots, n$	np	$np(1-p)$
Poisson(λ)	$P(X = k) = e^{-\lambda} \lambda^k / k!$ for $k = 0, 1, \ldots$	λ	λ
Geometric(p)	$P(X = k) = (1-p)^{k-1} p$ for $k = 1, 2, \ldots$	$1/p$	$(1-p)/p^2$
Uniform(a, b)	$f(x) = 1/(b-a)$ for $a < x < b$	$(a+b)/2$	$(b-a)^2/12$
Exponential(λ)	$f(x) = \lambda e^{-\lambda x}$ for $x > 0$	$1/\lambda$	$1/\lambda^2$
Normal(μ, σ^2)	$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(x-\mu)^2/2\sigma^2}$	μ	σ^2

$$E[\bar{X}] = \mu \qquad \mathrm{SD}(\bar{X}) = \frac{\sigma}{\sqrt{n}} \qquad E[\hat{p}] = p \qquad \mathrm{SD}(\hat{p}) = \sqrt{\frac{p(1-p)}{n}}$$

$$\mathrm{ME} = z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \qquad Z = \frac{p - p_0}{\sqrt{\frac{\hat{p_0}(1-\hat{p_0})}{n}}}$$