Discrete Distributions

	Counting # of Successes				Counting # of Trials	
Distribution	$Ber(p)$	$Bin(n, p)$	$HG(N, n, M)$	$Poi(\lambda)$	$Geo(p)$	$NB(r, p)$
Approximation		If n>100, p<0.01 $\rightarrow Poi(\lambda = np)$	If N>20n $\rightarrow Bin\left(n, p = \frac{M}{N}\right)$			
Key Words	1 trial	Independent With Replacement	Population Without Replacement	Average Rate	Until First Success	Until r Successes
Support	0,1	0, 1, …, n	0, 1, …, n	0, 1, …	1, 2 …	r, r+1, r+2 …
$P(X = a)$	$p^a(1-p)^{(1-a)}$	$\binom{n}{a}p^a(1-p)^{(n-a)}$	$\dfrac{\binom{M}{a}\binom{N-M}{n-a}}{\binom{N}{n}}$	$\dfrac{e^{-\lambda}\lambda^a}{a!}$	$p(1-p)^{a-1}$	$\binom{a-1}{r-1}p^r(1-p)^{(a-r)}$
$E(X)$	p	np	np Where $p = \frac{M}{N}$	λ	$\dfrac{1}{p}$	$\dfrac{r}{p}$
$Var(X)$	$p(1-p)$	$np(1-p)$	$\dfrac{N-n}{N-1}np(1-p)$	λ	$\dfrac{1-p}{p^2}$	$\dfrac{r(1-p)}{p^2}$