Name of special distribution (X)	Properties	What X represents and its range (R_X)	Params	Probability $P(X = x)$	Expected value $E(X)$	Variance $Var(X)$
Binomial distribution	○ You perform $\boldsymbol{n}$ **identical** experiments and you know $\boldsymbol{n}$ before starting ○ Each experiment or trial is **independent** of each other ○ The probability of success, $\boldsymbol{p}$ (or seeing a particular event) is the **same** for every trial	The number of successes observed $\boldsymbol{R_X}$: $\{0,1,2,\ldots,n\}$	n, p	$\binom{n}{x} p^x (1-p)^{n-x}$	np	$np(1-p)$
Hypergeometric distribution	○ I sample k objects from a **finite** population with b success and r failures ○ Each sample of k objects is **equally likely** to be chosen	The number of successes observed $\boldsymbol{R_X}$: $\{0,1,\ldots, min\{b,k\}\}$	k, b, r	$\frac{\binom{b}{x}\binom{r}{k-x}}{\binom{b+r}{k}}$	$\frac{kb}{b+r}$	$\frac{kbr(b+r-k)}{(b+r)^2(b+r-1)}$
Negative binomial distribution	○ You perform identical experiments and you **don't know** n before starting, rather you keep performing experiments until you observe m **successes** ○ Each experiment or trial is **independent** of each other ○ The probability of success, p is same for every trial	The number of trials before m-th success is observed $\boldsymbol{R_X}$: $\{m, m+\mathbf{1}, \ldots, \infty\}$	m, p	$\begin{cases} \binom{x-1}{m-1} p^m (1-p)^{x-m} \\ 0 \end{cases}$	$\frac{m}{p}$	$\frac{m(1-p)}{p^2}$

Poisson distribution	○ An event occurs at an average rate of λ such that:
	    ○ Occurrences of the event are **independent** of each other
	    ○ More than one of these events **can't** occur simultaneously
		The number of events
		
		$\boldsymbol{R_X}$: $\{0,1,2,\ldots,\infty\}$
			λ	$\frac{e^{-\lambda}\boldsymbol{\lambda}^x}{x!}$	λ	λ