Name of special distribution (X)	**Properties**	**Range (R_X) and Parameters**	**PDF (it is not probability X=x)** $f(x)$	**CDF** $F(x) = P(X \leq x)$	**Expected value** $E(X)$	**Variance** $Var(X)$
Uniform distribution	○ If all possible values of X are equally likely to occur ○ And all values fall in the range $[a, b]$	$\boldsymbol{R_X}: [\boldsymbol{a}, \boldsymbol{b}]$ Parameters: a, b	$f(x) = \begin{cases} \frac{1}{b-a} & a \leq x \leq b \\ 0 & otherwise \end{cases}$	$F(x) = \begin{cases} 0 & x \leq a \\ \frac{x-a}{b-a} & a \leq x \leq b \\ 1 & x \geq b \end{cases}$	$\frac{b+a}{2}$	$\frac{(b-a)^2}{12}$
Exponential distribution	○ X represents the waiting time between Poisson distribution events ○ X has property of being memoryless which means $P(X \geq x + x_0 \mid X \geq x_0) = P(X \geq x)$	$\boldsymbol{R_X}: [\boldsymbol{0}, \infty)$ Parameters: λ	$f(x) = \begin{cases} \lambda e^{-\lambda x} & x \geq 0 \\ 0 & otherwise \end{cases}$	$F(x) = 1 - e^{\{-\lambda x\}}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Normal distribution	○ When the pdf of X has a ________-curve shape ○ t-distribution is the normal distribution but wider (reflecting more uncertainty)	$\boldsymbol{R_X}: [-\infty, \infty)$ Parameters: μ, σ (and degrees of freedom for t-dist)	$f(x) = \frac{1}{\sqrt{\{2\pi\}}\sigma} e^{-(x-\mu)^2/2\sigma^2}$	Use z-table, t-table, or R	μ	σ^2

Gamma distribution
(Chi-squared distribution)
	○ Has two special cases: exponential distribution ($\alpha = 1$) and chi-squared distribution ($\alpha = \frac{\nu}{2}, \lambda = \frac{1}{2}$)
	○ Gamma function
	  ○ $\Gamma(\alpha) = (\alpha - 1)\Gamma(\alpha - 1)$
	  ○ $\Gamma(n) = (n-1)!$ If pos integer
	  ○ $\Gamma(1/2) = \sqrt{\pi}$
		$\boldsymbol{R_X}: [0, \infty)$
		Parameters: α, λ
		(Just ν for X^2)
			$f(x) = \begin{cases} \frac{1}{\Gamma(\alpha)} \lambda^\alpha x^{\alpha-1} e^{-\lambda x} & x \geq 0 \\ 0 & otherwise \end{cases}$	Use R or chi-squared table	$\frac{\alpha}{\lambda}$	$\frac{\alpha}{\lambda^2}$