Table 1: Summary of Probability Distributions

Distributions	Functions	Statistics	Generating Functions
Normal $\mathcal{N}(\mu, \sigma^2)$	$f_X(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ $F_X(x) = \Phi\left(\frac{x-\mu}{\sigma}\right)$	$E[X] = \mu$ $Var(X) = \sigma^2$	MGF: $e^{t\mu + \frac{1}{2}\sigma^2 t^2}$ CF: $e^{it\mu - \frac{1}{2}\sigma^2 t^2}$
These distributions are fundamental in statistical theory, modeling various types of data. The Normal distribution is central to the central limit theorem, while the Gamma distribution is crucial in modeling waiting times and life data.			
Gamma $\Gamma(k, \theta)$	$f_X(x) = \frac{1}{\Gamma(k)\theta^k} x^{k-1} e^{-x/\theta}$ $F_X(x) = \frac{1}{\Gamma(k)} \gamma\left(k, \frac{x}{\theta}\right)$	$E[X] = k\theta$ $Var(X) = k\theta^2$	MGF: $(1 - \theta t)^{-k}$ CF: $(1 - \theta it)^{-k}$
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