Table 1: Summary of Discrete Distributions

Distribution, notation	Density Function	Cumulative Distribution	Statistics	Generating Functions
One point $\delta(a)$	$p(a) = 1$	$F_X(k) = 0, \text{if } a < 0$ $F_X(k) = q, \text{if } a \geq 0$	$E[X] = a$ $Var(X) = 0$	$g_X(t) = ta$ $\psi_X(t) = e^{ta}$ $\varphi_X(t) = e^{ita}$
Pretentious to have this, i know, but i guess it needs to be complete or whatevs				
Bernoulli $B(p)$ $0 \leq p \leq 1$	$p(0) = q, p(1) = p; q = 1 - p$	$F_X(k) = 0, \text{if } k < 0$ $F_X(k) = q, \text{if } 0 \leq k < 1$ $F_X(k) = 1, \text{if } k \geq 1$	$E[X] = \frac{q}{p}$ $Var(X) = \frac{q}{p^2}$	$g_X(t) = q + pt$ $\psi_X(t) = q + pe^t$ $\varphi_X(t) = q + pe^{it}$
Lorem ipsum				
Geometric $G(p)$ $0 \leq p \leq 1$	$p(k) = pq^k, k = 0, 1, 2...; q = 1 - p$	$F_X(x) = 1 - q^{\lfloor x \rfloor + 1}$	$E[X] = \frac{q}{p}$ $Var(X) = \frac{q}{p^2}$	$g_X(t) = \frac{p}{1 - qt}$ $\psi_X(t) = \frac{p}{1 - qe^t}$ $\varphi_X(t) = \frac{p}{1 - qe^{it}}$
Lorem ipsum				
First success $G(p)$ $0 \leq p \leq 1$	$p(k) = pq^{k-1}, k = 1, 2...; q = 1 - p$	$F_X(x) = 1 - q^{\lfloor x \rfloor}$	$E[X] = \frac{q}{p}$ $Var(X) = \frac{q}{p^2}$	$g_X(t) = \frac{pt}{1 - qt}$ $\psi_X(t) = \frac{pe^t}{1 - qe^t}$ $\varphi_X(t) = \frac{pe^{it}}{1 - qe^{it}}$
Identical to Geometric, but always 1 larger				

Table 2: Summary of Probability Distributions

Distribution, notation	Density Function	Cumulative Distribution	Statistics	Generating Functions
Normal $\mathcal{N}(\mu, \sigma^2)$ $\sigma > 0$	$f_X(x) = \frac{1}{\sqrt{2\pi\sigma^2}} exp\left\{-\frac{1}{2}\frac{(x-\mu)^2}{\sigma^2}\right\}$	$F_X(x) = \Phi\left(\frac{x-\mu}{\sigma}\right)$	$E[X] = \mu$ $Var(X) = \sigma^2$	$\psi_X(t) = e^{t\mu + \frac{1}{2}\sigma^2 t^2}$ $\varphi_X(t) = e^{it\mu - \frac{1}{2}\sigma^2 t^2}$
The Normal distribution is central to the central limit theorem				
Gamma $\Gamma(p, a)$ $a > 0, p > 0$	$f_X(x) = \frac{1}{\Gamma(p)} x^{p-1} \frac{1}{a^p} e^{-x/a}$	$F_X(x) = \frac{1}{\Gamma(p)} \gamma\left(p, \frac{x}{a}\right)$	$E[X] = pa$ $Var(X) = pa^2$	$\psi_X(t) = \frac{1}{(1-at)^p}$ $\varphi_X(t) = \frac{1}{(1-ait)^p}$
Gamma is crucial in modeling waiting times and life data.				
(Student's) t $t(n)$ $n = 1, 2, ...$	$f_X(x) = \frac{\Gamma\left(\frac{n+1}{2}\right)}{\sqrt{\pi n}\,\Gamma\left(\frac{n}{2}\right)} \left(1 + \frac{x^2}{n}\right)^{-\frac{n+1}{2}}$	$No.$	$E[X] = 0$ $Var(X) = \frac{n}{n-2}, n > 2$	$\psi_X(t) = undefined$ $\varphi_X(t) = No.$
Student t is crucial in modeling waiting times and life data.				