Some important families of probability distributions

Discrete

	Range	$p_X(x)$	μ	σ^2	$M_X(t)$
Binomial(n,p)	$0,1,\ldots,n$	$\binom{n}{x}p^x q^{n-x}$	np	npq	$(pe^t+q)^n$
Geometric(p)	$1,2,\ldots$	pq^{x-1}	$\frac{1}{p}$	$\frac{q}{p^2}$	$\frac{pe^t}{1-qe^t}$
Negative Binomial(r,p)	$r,r+1,\ldots$	$\binom{x-1}{r-1}p^r q^{x-r}$	$\frac{r}{p}$	$\frac{qr}{p^2}$	$\left(\frac{pe^t}{1-qe^t}\right)^r$
Hypergeometric(N,K,n)	$0,1,\ldots,n$	$\frac{\binom{K}{x}\binom{N-K}{n-x}}{\binom{N}{n}}$	$\frac{nK}{N}$	$\frac{nK(N-K)(N-n)}{N^2(N-1)}$	
Poisson(μ)	$0,1,\ldots$	$\frac{e^{-\mu}\mu^x}{x!}$	μ	μ	$e^{\mu(e^t-1)}$

Continuous

	Range	$\mathrm{f_X(x)}$	μ	σ^2	$M_X(t)$
Uniform(a,b)	(a,b)	$\frac{1}{b-a}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{tb}-e^{ta}}{t(b-a)}$
Exponential(β)	$(0,\infty)$	$\frac{1}{\beta}e^{-x/\beta}$	β	β^2	$\frac{1}{1-\beta t}$
Normal(μ,σ)	$(-\infty,\infty)$	$\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	μ	σ^2	$e^{\mu t+\sigma^2t^2/2}$
Gamma(α,β)	$(0,\infty)$	$\frac{1}{\beta^\alpha\Gamma(\alpha)}x^{\alpha-1}e^{-x/\beta}$	$\alpha\beta$	$\alpha\beta^2$	$\left(\frac{1}{1-\beta t}\right)^\alpha$
Beta(α,β)	$(0,1)$	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}x^{\alpha-1}(1-x)^{\beta-1}$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$	
Student's t(n)	$(-\infty,\infty)$	$\frac{\Gamma(\frac{n+1}{2})}{\Gamma(\frac{n}{2})\sqrt{\pi n}}\left(1+\frac{x^2}{n}\right)^{-(n+1)/2}$	0	$\frac{n}{n-2}$	
$\chi^2(n)$	$(0,\infty)$	$\frac{x^{n/2-1}}{2^{n/2}\Gamma(n/2)}e^{-x/2}$	n	$2n$	$\left(\frac{1}{1-2t}\right)^{n/2}$
$F(n_1,n_2)$	$(0,\infty)$		$\frac{n_2}{n_2-2}$	$\frac{2n_2^2(n_1+n_2-2)}{n_1(n_2-2)^2(n_2-4)}$	