Discrete Distributions

Distribution	θ	PMF	$E(X)$	$Var(X)$	MGF	Support
Bernoulli	p	$p^x(1-p)^{1-x}$	p	$p(1-p)$	$1-p+pe^t$	$X=0,1$
Binomial	n,p	$\binom{n}{x}p^x(1-p)^{n-x}$	np	$np(1-p)$	$(1-p+pe^t)^n$	$X=0,1,\ldots,n$
Poisson	λ	$\frac{e^{-\lambda}\lambda^x}{x!}$	λ	λ	$e^{\lambda(e^t-1)}$	$X=0,1,\ldots,\infty$
Geometric	p	$p(1-p)^{x-1}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$	$\frac{pe^t}{1-(1-p)e^t}$	$X=1,2,\ldots,\infty$
Negative Binomial	$r,\ p$	$\binom{x-1}{r-1}p^{r-1}(1-p)^{x-r}$	$\frac{pr}{1-p}$	$\frac{(1-p)r}{p^2}$	$\left(\frac{1-p}{1-pe^t}\right)^n$	$X=0,1,\ldots,\infty$

Continuous Distributions

Distribution	θ	PDF	$E(X)$	$Var(X)$	MGF	Support
Uniform	a, b	$\frac{1}{b-a}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{tb}-e^{ta}}{t(b-a)}$	$a \leq X \leq b$
Normal	μ, σ^2	$\frac{1}{\sqrt{2\pi\sigma^2}}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	μ	σ^2	$e^{\mu t+\frac{t^2}{2}\sigma^2}$	$-\infty \leq X \leq \infty$
Exponential	λ	$\lambda e^{-x\lambda}$	$1/\lambda$	$1/\lambda^2$	$\frac{\lambda}{\lambda-t}$	$0 \leq X$
χ^2	k	$\frac{1}{2^{k/2}\Gamma(k/2)}x^{k/2-1}e^{-x/2}$	k	$2k$	$(1-2t)^{-k/2}$	$0 \leq X$
Gamma	α, β	$\frac{1}{\beta^\alpha\Gamma(\alpha)}x^{\alpha-1}e^{-x/\beta}$	$\alpha\beta$	$\alpha\beta^2$	$(1-\beta t)^{-\alpha}$	$0 \leq X$
Beta	α, β	$\frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha+\beta)}x^{\alpha-1}(1-x)^\beta$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$		$0 \leq X \leq 1$
Laplace	μ, b	$\frac{1}{2b}e^{-\frac{\lvert x-\mu\rvert}{b}}$	μ	$2b^2$	$\frac{e^{\mu t}}{1-b^2t^2}$	$-\infty \leq X \leq \infty$
Logistic	μ, s	$\frac{e^{\frac{-(x-\mu)}{s}}}{s\left(1+e^{\frac{-(x-\mu)}{s}}\right)^2}$	μ	$\frac{s^2\pi^2}{3}$	$e^{\mu t}\frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha+\beta)}$	$-\infty \leq X \leq \infty$