Appendix V

Table of distributions

	mass/density function	domain	mean	variance	skewness	characteristic function
Bernoulli	$f(1)=p,\ f(0)=q=1-p$	$\{0,1\}$	p	pq	$\frac{q-p}{\sqrt{pq}}$	$q+pe^{it}$
Uniform (discrete)	n^{-1}	$\{1,2,\dots,n\}$	$\frac{1}{2}(n+1)$	$\frac{1}{12}(n^2-1)$	0	$\frac{e^{it}(1-e^{int})}{n(1-e^{it})}$
Binomial $\mathrm{bin}(n,p)$	$\binom{n}{k}p^k(1-p)^{n-k}$	$\{0,1,\dots,n\}$	np	$np(1-p)$	$\frac{1-2p}{\sqrt{np(1-p)}}$	$(1-p+pe^{it})^n$
Geometric	$p(1-p)^{k-1}$	$k=1,2,\dots$	p^{-1}	$(1-p)p^{-2}$	$\frac{2-p}{\sqrt{1-p}}$	$\frac{p}{e^{-it}-1+p}$
Poisson	$e^{-\lambda}\lambda^k/k!$	$k=0,1,2,\dots$	λ	λ	$\lambda^{-\frac{1}{2}}$	$\exp\{\lambda(e^{it}-1)\}$
Negative binomial	$\binom{k-1}{n-1}p^n(1-p)^{k-n}$	$k=n,n+1,\dots$	np^{-1}	$n(1-p)p^{-2}$	$\frac{2-p}{\sqrt{n(1-p)}}$	$\left(\frac{p}{e^{-it}-1+p}\right)^n$
Hypergeometric	$\frac{\binom{b}{k}\binom{N-b}{n-k}}{\binom{N}{n}},\ p=\frac{b}{N},\ q=\frac{N-b}{N}$	$\{0,1,2,\dots,b\wedge n\}$	np	$\frac{npq(N-n)}{N-1}$	$\frac{q-p}{\sqrt{npq}}\sqrt{\frac{N-1}{N-n}}\left(\frac{N-2n}{N-2}\right)$	$\frac{\binom{N-b}{n}}{\binom{N}{n}}F(-n,-b;N-b-n+1;e^{it})$†
Uniform (continuous)	$(b-a)^{-1}$	$[a,b]$	$\frac{1}{2}(a+b)$	$\frac{1}{12}(b-a)^2$	0	$\frac{e^{ibt}-e^{iat}}{it(b-a)}$
Exponential	$\lambda e^{-\lambda x}$	$[0,\infty)$	λ^{-1}	λ^{-2}	2	$\frac{\lambda}{\lambda-it}$
Normal $N(\mu,\sigma^2)$	$\frac{1}{\sqrt{2\pi\sigma^2}}\exp\left\{-\frac{(x-\mu)^2}{2\sigma^2}\right\}$	$\mathbb{R}$	μ	σ^2	0	$e^{i\mu t-\frac{1}{2}\sigma^2t^2}$
Gamma $\Gamma(\lambda,\tau)$	$\frac{1}{\Gamma(\tau)}\lambda^\tau x^{\tau-1}e^{-\lambda x}$	$[0,\infty)$	$\tau\lambda^{-1}$	$\tau\lambda^{-2}$	$2\tau^{-\frac{1}{2}}$	$\left(\frac{\lambda}{\lambda-it}\right)^\tau$
Cauchy	$\frac{1}{\pi(1+x^2)}$	$\mathbb{R}$	–	–	–	$e^{-\lvert t\rvert}$
Beta $\beta(a,b)$	$\frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)}x^{a-1}(1-x)^{b-1}$	$[0,1]$	$\frac{a}{a+b}$	$\frac{ab(a+b)^{-2}}{a+b+1}$	$\frac{2(a-b)}{a+b+2}$	$M(a,a+b,it)$†
Doubly exponential	$\exp(-x-e^{-x})$	$\mathbb{R}$	γ†	$\frac{1}{6}\pi^2$	$1.29857\dots$	$\Gamma(1-it)$
Rayleigh	$xe^{-\frac{1}{2}x^2}$	$[0,\infty)$	$\sqrt{\frac{\pi}{2}}$	$2-\frac{\pi}{2}$	$\frac{2\sqrt{\pi}(\pi-3)}{(4-\pi)^{3/2}}$	$1+\sqrt{2\pi}it(1-\Phi(-it))e^{-\frac{1}{2}t^2}$†
Laplace	$\frac{1}{2}\lambda e^{-\lambda\lvert x\rvert}$	$\mathbb{R}$	0	$2\lambda^2$	0	$\frac{\lambda^2}{\lambda^2+t^2}$

†The letter γ denotes Euler's constant.

†$F(a,b;c;z)$ is Gauss's hypergeometric function and $M(a,a+b,it)$ is a confluent hypergeometric function. The $N(0,1)$ distribution function is denoted by Φ.