Random variable	Probability density function $f_X(x)$	Mean	Variance	Characteristic function $\Phi_X(\omega)$
Normal or Gaussian $N(\mu, \sigma^2)$	$\frac{1}{\sqrt{2\pi\sigma^2}} e^{-(x-\mu)^2/2\sigma^2}$, $-\infty < x < \infty$	μ	σ^2	$e^{j\mu\omega - \sigma^2\omega^2/2}$
ln Log-normal	$\frac{1}{x\sqrt{2\pi\sigma^2}} e^{-(\ln x - \mu)^2/2\sigma^2}$, $x \geq 0$	—	—	—
Exponential $E(\lambda)$	$\lambda e^{-\lambda x}, x \geq 0, \lambda > 0$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$	$(1 - j\omega/\lambda)^{-1}$
Gamma $G(\alpha, \beta)$	$\frac{x^{\alpha-1}}{\Gamma(\alpha)\beta^\alpha} e^{-x/\beta}$, $x \geq 0, \alpha > 0, \beta > 0$	$\alpha\beta$	$\alpha\beta^2$	$(1 - j\omega\beta)^{-\alpha}$
Erlang-k	$\frac{(k\lambda)^k}{(k-1)!} x^{k-1} e^{-k\lambda x}$	$\frac{1}{\lambda}$	$\frac{1}{k\lambda^2}$	$(1 - j\omega/k\lambda)^{-k}$
Chi-square $\chi^2(n)$	$\frac{x^{n/2-1}}{2^{n/2}\Gamma(n/2)} e^{-x/2}, x \geq 0$	n	$2n$	$(1 - j2\omega)^{-n/2}$
Weibull	$\alpha x^{\beta-1} e^{-\alpha x^\beta/\beta}$, $x \geq 0, \alpha > 0, \beta > 0$	$\left(\frac{\beta}{\alpha}\right)^{1/\beta} \Gamma\left(1 + \frac{1}{\beta}\right)$	$\left(\frac{\beta}{\alpha}\right)^{2/\beta} \left[\Gamma\left(1 + \frac{2}{\beta}\right) - \left\{\Gamma\left(1 + \frac{1}{\beta}\right)\right\}^2\right]$	—
Rayleigh	$\frac{x}{\sigma^2} e^{-x^2/2\sigma^2}, x \geq 0$	$\sqrt{\frac{\pi}{2}}\sigma$	$(2 - \pi/2)\sigma^2$	$\left(1 + j\sqrt{\frac{\pi}{2}}\sigma\omega\right) e^{-\sigma^2\omega^2/2}$
Uniform $U(a, b)$	$\frac{1}{b-a}, a < x < b$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{jb\omega} - e^{-ja\omega}}{j\omega(b-a)}$
Beta $\beta(\alpha, \beta)$	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1}(1-x)^{\beta-1}$, $0 < x < 1, \alpha > 0, \beta > 0$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$	—
Cauchy $C(\alpha, \mu)$	$\frac{\alpha/\pi}{(x-\mu)^2 + \alpha^2}$, $-\infty < x < \infty, \alpha > 0$	—	∞	$e^{j\mu\omega} e^{-\alpha\lvert\omega\rvert}$
Rician	$\frac{x}{\sigma^2} e^{-(x^2+a^2)/2\sigma^2} I_0\left(\frac{ax}{\sigma^2}\right)$, $-\infty < x < \infty, a > 0$	$\sigma\frac{\sqrt{\pi}}{2}[(1+r)I_0(r/2) + rI_1(r/2)]e^{-r/2}$, $r = a^2/2\sigma^2$	—	—
Nakagami-m	$\frac{2}{\Gamma(m)}\left(\frac{m}{\Omega}\right)^m x^{2m-1} e^{-(m/\Omega)x^2}$, $x > 0$	$\frac{\Gamma(m+1/2)}{\Gamma(m)}\sqrt{\frac{\Omega}{m}}$	$\Omega\left\{1 - \frac{1}{m}\left(\frac{\Gamma(m+1/2)}{\Gamma(m)}\right)^2\right\}$	—

Random variable	Probability density function $f_x(x)$	Mean	Variance	Characteristic function $\Phi_x(\omega)$
Students' $t(n)$	$\frac{\Gamma((n+1)/2)}{\sqrt{\pi n}\,\Gamma(n/2)}(1+x^2/n)^{-(n+1)/2}$, $-\infty < x < \infty$	0	$\frac{n}{n-2}, n>2$	—
F distribution	$\frac{\Gamma((m+n)/2)}{\Gamma(m/2)\Gamma(n/2)}\left(\frac{m}{n}\right)^{m/2} x^{m/2-1} \times \left(1+\frac{mx}{n}\right)^{-(m+n)/2}, x>0$	$\frac{n}{n-2}, \quad n>2$	$\frac{n^2(2m+2n-4)}{m(n-2)^2(n-4)}, \quad n>4$	—
Bernoulli	$P(\mathbf{x}=1)=p, P(\mathbf{x}=0)=1-p=q$	p	$p(1-p)$	$pe^{j\omega}+q$
Binomial $B(n, p)$	$\binom{n}{k} p^k q^{n-k}$, $k=0,1,2,\ldots,n,\ p+q=1$	np	npq	$(pe^{j\omega}+q)^n$
Poisson $P(\lambda)$	$e^{-\lambda}\frac{\lambda^k}{k!}, k=0,1,2,\ldots,\infty$	λ	λ	$e^{-\lambda(1-e^{j\omega})}$
Hypergeometric	$\frac{\binom{M}{k}\binom{N-M}{n-k}}{\binom{N}{n}}$, $\max(0, M+n-N) \le k \le \min(M, n)$	$\frac{nM}{N}$	$n\frac{M}{N}\left(1-\frac{M}{N}\right)\left(1-\frac{n-1}{N-1}\right)$	—
Geometric	$\begin{cases} pq^k, \\ k=0,1,2,\ldots,\infty \\ \text{or} \\ pq^{k-1}, \\ k=1,2,\ldots,\infty,\ p+q=1 \end{cases}$	$\frac{q}{p}$ $\frac{1}{p}$	$\frac{q}{p^2}$ $\frac{q}{p^2}$	$\frac{p}{1-qe^{j\omega}}$ $\frac{p}{e^{-j\omega}-q}$
Pascal or negative binomial $NB(r, p)$	$\begin{cases} \binom{r+k-1}{k} p^r q^k, \\ k=0,1,2,\ldots,\infty \\ \text{or} \\ \binom{k-1}{r-1} p^r q^{k-r}, \\ k=r, r+1,\ldots,\infty,\ p+q=1 \end{cases}$	$\frac{rq}{p}$ $\frac{r}{p}$	$\frac{rq}{p^2}$ $\frac{rq}{p^2}$	$\left(\frac{p}{1-qe^{j\omega}}\right)^r$ $\left(\frac{p}{e^{-j\omega}-q}\right)^r$
Discrete uniform	$1/N$, $k=1,2,\ldots,N$	$\frac{N+1}{2}$	$\frac{N^2-1}{12}$	$e^{j(N+1)\omega/2}\frac{\sin(N\omega/2)}{\sin(\omega/2)}$
Multivariate Gaussian $X=(x_1, x_2, \ldots, x_n)$ $m=(m_1, m_2, \ldots, m_n)$ $u=(u_1, u_2, \ldots, u_n)$ $C=(C_{ik})$, $i, k=1,2,\ldots,n$	$\frac{1}{(2\pi)^{n/2}\det C} e^{-\{(X-m)C^{-1}(X-m)^t/2\}}$ $C_{ik}=E[(\mathbf{x}_i-m_i)(\mathbf{x}_k-m_k)^*]$	m	C (Covariance matrix)	$e^{\{jmu^t-uCu^t/2\}}$