

Name	Usage	Density	Lower	Upper
Beta	<code>dbeta(a,b)</code> $a > 0, b > 0$	$\frac{x^{a-1}(1-x)^{b-1}}{\beta(a,b)}$	0	1
Chi-square	<code>dchisqr(k)</code> $k > 0$	$\frac{x^{\frac{k}{2}-1} \exp(-x/2)}{2^{\frac{k}{2}} \Gamma(\frac{k}{2})}$	0	
Double exponential	<code>ddexp(mu,tau)</code> $\tau > 0$	$\tau \exp(-\tau x - \mu)/2$		
Exponential	<code>dexp(lambda)</code> $\lambda > 0$	$\lambda \exp(-\lambda x)$	0	
F	<code>df(n,m)</code> $n > 0, m > 0$	$\frac{\Gamma(\frac{n+m}{2})}{\Gamma(\frac{n}{2})\Gamma(\frac{m}{2})} \left(\frac{n}{m}\right)^{\frac{n}{2}} x^{\frac{n}{2}-1} \left\{1 + \frac{nx}{m}\right\}^{-\frac{(n+m)}{2}}$	0	
Gamma	<code>dgamma(r, lambda)</code> $\lambda > 0, r > 0$	$\frac{\lambda^r x^{r-1} \exp(-\lambda x)}{\Gamma(r)}$	0	
Generalized gamma	<code>dgen.gamma(r,lambda,b)</code> $\lambda > 0, b > 0, r > 0$	$\frac{b \lambda^{br} x^{br-1} \exp\{-(\lambda x)^b\}}{\Gamma(r)}$	0	
Logistic	<code>dlogis(mu, tau)</code> $\tau > 0$	$\frac{\tau \exp\{(x - \mu)\tau\}}{[1 + \exp\{(x - \mu)\tau\}]^2}$		
Log-normal	<code>dlnorm(mu,tau)</code> $\tau > 0$	$\left(\frac{\tau}{2\pi}\right)^{\frac{1}{2}} x^{-1} \exp\{-\tau(\log(x) - \mu)^2/2\}$	0	
Noncentral Chi-square	<code>dnchisqr(k, delta)</code> $k > 0, \delta \geq 0$	$\sum_{r=0}^{\infty} \frac{\exp(-\frac{\delta}{2})(\frac{\delta}{2})^r}{r!} \frac{x^{(k/2+r-1)} \exp(-\frac{x}{2})}{2^{(k/2+r)} \Gamma(\frac{k}{2}+r)}$	0	
Normal	<code>dnorm(mu,tau)</code> $\tau > 0$	$\left(\frac{\tau}{2\pi}\right)^{\frac{1}{2}} \exp\{-\tau(x - \mu)^2/2\}$		
Pareto	<code>dpar(alpha, c)</code> $\alpha > 0, c > 0$	$\alpha c^\alpha x^{-(\alpha+1)}$	c	
Student t	<code>dt(mu,tau,k)</code> $\tau > 0, k > 0$	$\frac{\Gamma(\frac{k+1}{2})}{\Gamma(\frac{k}{2})} \left(\frac{\tau}{k\pi}\right)^{\frac{1}{2}} \left\{1 + \frac{\tau(x-\mu)^2}{k}\right\}^{-\frac{(k+1)}{2}}$		
Uniform	<code>dunif(a,b)</code> $a < b$	$\frac{1}{b-a}$	a	b
Weibull	<code>dweib(v, lambda)</code> $v > 0, \lambda > 0$	$v \lambda x^{v-1} \exp(-\lambda x^v)$	0	

Table 6.1: Univariate real-valued distributions in the **bugs** module

Name	Usage	Density	Lower	Upper
Beta	dbetabin(a, b, n)	$\binom{a+x-1}{x} \binom{b+n-x-1}{n-x} \binom{a+b+n-1}{n}^{-1}$	0	n
binomial	$a > 0, b > 0, n \in \mathbb{N}^*$			
Bernoulli	dbern(p) $0 < p < 1$	$p^x (1-p)^{1-x}$	0	1
Binomial	dbin(p, n) $0 < p < 1, n \in \mathbb{N}^*$	$\binom{n}{x} p^x (1-p)^{n-x}$	0	n
Categorical	dcat(pi) $\pi \in (\mathbb{R}^+)^N$	$\frac{\pi_x}{\sum_i \pi_i}$	1	N
Noncentral hypergeometric	dhyper(n1, n2, m1, psi) $0 \leq n_i, 0 < m_1 \leq n_+$	$\frac{\binom{n_1}{x} \binom{n_2}{m_1-x} \psi^x}{\sum_i \binom{n_1}{i} \binom{n_2}{m_1-i} \psi^i}$	$\max(0, n_+ - m_1)$	$\min(n_1, m_1)$
Negative binomial	dnegbin(p, r) $0 < p \leq 1, r \geq 0$	$\binom{x+r-1}{x} p^r (1-p)^x$	0	
Poisson	dpois(lambda) $\lambda > 0$	$\frac{\exp(-\lambda) \lambda^x}{x!}$	0	

Table 6.2: Discrete univariate distributions in the **bugs** module

Name	Usage	Density
Dirichlet	p ~ ddirch(alpha) $\alpha_j \geq 0$	$\Gamma(\sum_i \alpha_i) \prod_j \frac{p_j^{\alpha_j-1}}{\Gamma(\alpha_j)}$
Multivariate normal	x ~ dmnorm(mu, Omega) Ω $p \times p$ positive definite	$ \Omega ^{\frac{1}{2}} (2\pi)^{-\frac{p}{2}} \exp\{-(x-\mu)^T \Omega (x-\mu)/2\}$
Wishart	Omega ~ dwish(R, k) R $p \times p$ pos. def., $k \geq p$	$\frac{ \Omega ^{(k-p-1)/2} R ^{k/2} \exp\{-\text{Tr}(R\Omega/2)\}}{2^{pk/2} \Gamma_p(k/2)}$
Multivariate Student t	x ~ dmt(mu, Omega, k) Ω pos. def.	$\frac{\Gamma\{(k+p)/2\}}{\Gamma(k/2)(n\pi)^{p/2}} \Omega ^{1/2} \left\{1 + \frac{1}{k}(x-\mu)^T \Omega (x-\mu)\right\}^{-\frac{(k+p)}{2}}$
Multinomial	x ~ dmulti(pi, n) $\sum_j x_j = n$	$n! \prod_j \frac{\pi_j^{x_j}}{x_j!}$

Table 6.3: Multivariate distributions in the **bugs** module

Distribution	Canonical name	Alias	Same name as
Binomial	dbin	dbinom	R
Chi-square	dchisqr	dchisq	R
Generalized gamma	dgen.gamma	dggamma	OpenBUGS
Negative binomial	dnegbin	dnbinom	R
Weibull	dweib	dweibull	R
Dirichlet	ddirch	ddirich	OpenBUGS

Table 6.4: Distributions with aliases in **bugs** module