Distributions in Reliability sub-system

Birnbaum-Saunders

x ~ dbs(alpha, beta)
$$\frac{1}{\sqrt{2\pi x^3}} \; \frac{(x+\beta)}{2\alpha\sqrt{\beta}} \; \exp\left\{-\frac{1}{2\alpha^2}\left(\frac{x}{\beta}+\frac{\beta}{x}-2\right)\right\} \; ; \; x > 0$$

Burr X (Generalized Rayleigh)

x ~ dburrX(alpha, lambda)
$$2\,\alpha\,\lambda^2\,x\,e^{-(\lambda x)^2}\left\{1-e^{-(\lambda x)^2}\right\}^{\alpha-1} \; ; \; x > 0$$

Burr XII Distribution

x ~ dburrXII(alpha, beta)
$$\alpha\,\beta\;x^{\beta-1}\left\{1+x^\beta\right\}^{-(\alpha+1)} \quad ; \quad x > 0.$$

Exponential Power (Smith & Bain)

x ~ dexp.power(alpha, lambda)
$$\alpha\,\lambda^\alpha\;x^{\alpha-1}\,e^{(\lambda x)^\alpha}\,exp\left\{1-e^{(\lambda x)^\alpha}\right\} \; ; x \geq 0$$

Exponentiated Weibull

x ~ dexp.weib(alpha, theta)
$$\alpha\,\theta\;x^{\alpha-1}\,e^{-x^\alpha}\left\{1-\exp\left(-x^\alpha\right)\right\}^{\theta-1} \; ; \; x > 0$$

Extended Exponential (Marshall-Olkin)

x ~ dext.exp(alpha, lambda)
$$\frac{\alpha\,\lambda\,e^{-\lambda x}}{\left\{1-(1-\alpha)\,e^{-\lambda x}\right\}^2} \; ; \quad x > 0$$

Extended Weibull(Marshall-Olkin)

x ~ dext.weib(alpha, lambda)
$$\frac{\lambda \alpha \, x^{\alpha-1} \exp\left(-x^{\alpha}\right)}{\left\{1-(1-\lambda)\exp\left(-x^{\alpha}\right)\right\}^{2}} \; ; \quad x > 0$$

Flexible Weibull

x ~ dflex.weib(alpha, beta)
$$\left(\alpha + \frac{\beta}{x^{2}}\right) \, exp\left(\alpha x - \frac{\beta}{x}\right) \, exp\left\{-exp\left(\alpha x - \frac{\beta}{x}\right)\right\} \; ; x \geq 0$$

Generalized Exponential

x ~ dgen.exp(alpha, lambda)
$$\alpha \, \lambda \, e^{-\lambda x}\left\{1-e^{-\lambda x}\right\}^{\alpha-1} \; ; \; x > 0$$

Generalized Power Weibull

x ~dgp.weibull(alpha, theta)
$$\alpha \theta \, x^{\alpha-1}\left(1+x^{\alpha}\right)^{\theta-1} exp\left\{1-\left(1+x^{\alpha}\right)^{\theta}\right\} \; ; x \geq 0$$

Gompertz

x ~dgpz(alpha, theta)
$$\theta \, e^{\alpha x} \, exp\left\{\frac{\theta}{\alpha}\left(1-e^{\alpha x}\right)\right\} \; ; x \geq 0$$

Gumbel

x ~dgumbel(mu, sigma)
$$\frac{1}{\sigma} exp\left\{-\left(\frac{x-\mu}{\sigma}\right)\right\} \, exp\left[-exp\left\{-\left(\frac{x-\mu}{\sigma}\right)\right\}\right]; \quad -\infty < x < \infty$$

Inverse Gaussian

x ~ dinv.gauss(mu, lambda)
$$\sqrt{\left(\frac{\lambda}{2\pi}\right)} \; x^{-3/2} \, exp\left\{-\frac{\lambda(x-\mu)^{2}}{2\mu^{2}x}\right\} \; ; x > 0$$

Inverse Weibull

x ~dinv.weib(beta, lambda)
$$\beta \; \lambda^{\beta} \; x^{-(\beta+1)} \; exp\left\{-\left(\frac{\lambda}{x}\right)^{\beta}\right\} \quad ; x > 0$$

Linear Failure Rate

x ~dlin.fr(alpha, beta)
$$(\alpha + \beta x)\exp\left\{-\left(\alpha x + \frac{\beta x^2}{2}\right)\right\} \quad ; x \geq 0$$

Logistic-exponential

x ~dlogis.exp(alpha, lambda)
$$\frac{\lambda \, \alpha \, e^{\lambda x}\left(e^{\lambda x}-1\right)^{\alpha-1}}{\left\{1+\left(e^{\lambda x}-1\right)^{\alpha}\right\}^2} \quad ; x \geq 0$$

Log-logistic Distribution

x ~dlog.logis(beta, theta)
$$\frac{\beta(x/\theta)^{\beta}}{x\left\{1+(x/\theta)^{\beta}\right\}^2} \quad ; \quad x > 0.$$

Log-Weibull

x ~dlog.weib(mu, sigma)
$$\frac{1}{\sigma} \; exp\left(\frac{x-\mu}{\sigma}\right) . exp\left\{-exp\left(\frac{x-\mu}{\sigma}\right)\right\} \quad ; \quad -\infty < x < \infty$$

Modified Weibull

x ~ dweib.modified(alpha, beta, lambda)
$$\alpha \, (\beta + \lambda x)\, x^{\beta-1} \, e^{\lambda x} \, exp\left\{-\alpha \, x^{\beta} e^{\lambda x}\right\} \quad ; x > 0$$