Let X be a triangular random variable with parameters `min=` a, `max=` b, and `mode=` c.

Probability Density and Cumulative Distribution Function The density function of X is given by:

$$f(x; a, b, c) = \qquad \frac{2(x-a)}{(b-a)(c-a)} \qquad \text{for } a \leq x \leq c$$

$$\frac{2(b-x)}{(b-a)(b-c)} \qquad \text{for } c \leq x \leq b$$

where $a < c < b$.

The cumulative distribution function of X is given by:

$$F(x; a, b, c) = \qquad \frac{(x-a)^2}{(b-a)(c-a)} \qquad \text{for } a \leq x \leq c$$

$$1 - \frac{(b-x)^2}{(b-a)(b-c)} \qquad \text{for } c \leq x \leq b$$

where $a < c < b$.

Quantiles The $p^t h$ quantile of X is given by:

$$x_p = \qquad a + \sqrt{(b-a)(c-a)p} \qquad \text{for } 0 \leq p \leq F(c)$$

$$b - \sqrt{(b-a)(b-c)(1-p)} \qquad \text{for } F(c) \leq p \leq 1$$

where $0 \leq p \leq 1$.

Random Numbers Random numbers are generated using the inverse transformation method:

$$x = F^{-1}(u)$$

where u is a random deviate from a uniform $[0, 1]$ distribution.

Mean and Variance The mean and variance of X are given by:

$$E(X) = \frac{a+b+c}{3}$$

$$Var(X) = \frac{a^2 + b^2 + c^2 - ab - ac - bc}{18}$$

Value

`dtri` gives the density, `ptri` gives the distribution function, `qtri` gives the quantile function, and `rtri` generates random deviates.

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