

# Rayleigh Distribution

$$f(x) = \frac{k}{\lambda} \left(\frac{x}{\lambda}\right)^{k-1} e^{-\frac{x}{\lambda} k}$$

Transformation	General	Example: Rayleigh(1)										
	PDF	PDF	CDF	HF	IDF	$\mu$	$\sigma^2$	MF	MGF	HF Shape	Support	Comment
$x^2$	✓	✓	✓	✓	✓	✓	✓	✓	$\partial$	MEM	$0, \infty$	
$\sqrt{x}$	✓	✓	✓	✓	✓	✓	✓	✓	✓	IFR	$0, \infty$	
$x^{-1}$	✓	✓	✓	✓	✓	✓	$\infty$	✓	✓	UBT	$0, \infty$	
$\arctan(x)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, \frac{1}{2}\pi$	
$e^x$	✓	✓	✓	✓	✓	✓	✓	$\partial$	$\partial$	UBT	$1, \infty$	
$\ln(x)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$-\infty, \infty$	
$e^{-x}$	✓	✓	✓	✓	✓	✓	✓	✓	$\partial$	IFR	$0, 1$	
$-\ln(x)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	MM	$-\infty, \infty$	
$\ln(x+1)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, \infty$	
$1/\ln(x+2)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, \frac{1}{\ln(2)}$	
$\tanh(x)$	✓	✓	✓	✓		$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, 1$	
$\sinh(x)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	UBT	$0, \infty$	
$\operatorname{arcsinh}(x)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, \infty$	
$\operatorname{csch}(x+1)$	✓	✓	$\partial$	$\partial$		$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, \frac{2}{e-e^{-1}}$	
$\operatorname{arccsch}(x+1)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	???	$0, \ln(1+\sqrt{2})$	
$1/\tanh(x+1)$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$\frac{e+e^{-1}}{e-e^{-1}}$	
$1/\sinh(x+1)$	✓	✓	✓	✓		$\partial$	$\partial$	$\partial$	$\partial$	???	$0, \frac{2}{e-e^{-1}}$	
$1/\operatorname{arcsinh}(x+1)$	✓	✓	✓	✓	✓			$\partial$	$\partial$	IFR	$0, 1$	
$1/\operatorname{csch}(x)+1$	✓	✓	$\partial$	$\partial$		$\partial$	$\partial$	$\partial$	$\partial$	UBT	$1, \infty$	
$\tanh(x^{-1})$	✓	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, 1$	
$\operatorname{csch}(x^{-1})$	✓	✓	$\partial$	$\partial$		$\partial$	$\partial$	$\partial$	$\partial$		$0, \infty$	
$\operatorname{arccsch}(x^{-1})$	✓	✓	✓	✓	$\partial$	$\partial$	$\partial$	$\partial$	$\partial$	IFR	$0, \infty$	

## Legend

Symbol	Meaning
✓	Exists, Closed Form
$\partial$	Exists, Not Closed Form
$\emptyset$	Not Possible
	Not Calculated