Chi Squared Distribution

$$f(x) = \frac{x^{a-1}\mathrm{e}^{-x^2/2}}{2^{a/2-1}\Gamma(a/2)} \qquad x, a > 0$$

Transformation	General PDF	Example: ChiSquare(3) PDF	CDF	HF	IDF	μ	σ^2	MF	MGF	HF Shape	Support	Comment
x^2	✓	✓	✓	✓		✓	✓	✓	✓	DFR	$0,\infty$	
$\sqrt{x}$	✓	✓	✓	✓	∂	✓	✓	∂	✓	IFR	$0,\infty$	
x^{-1}	✓	✓	✓	✓		✓	∞	✓	✓	DFR	$0,\infty$	
$\arctan(x)$	✓	✓	✓	✓	∂	✓	∂	∂	∂	IFR	$0,\pi/2$	piecewise CDF
e^x	✓	✓	✓	✓		∞	✓	∂	∂	UBT	$1,\infty$	
$\ln(x)$	✓	✓	∂	∂	∂	∂	∂	∂	∂		$-\infty,\infty$	
e^{-x}	✓	✓	✓	✓		✓	✓	✓	∂	BT	$0,1$	
$-\ln(x)$	✓	✓	∂	∂		∂	∂	∂	∂		$-\infty,\infty$	
$\ln(x+1)$	✓	✓	✓	✓		∂	∂	∂	∂		$0,\infty$	
$1/\ln(x+2)$	✓	✓	∂	∂		∂	∂	∂	∂		$0,1/\ln(2)$	
$\tanh(x)$	✓	✓	∂	∂		∂	∂	∂	∂	IFR	$0,1$	
$\sinh(x)$	✓	✓	∂	∂		∞	✓	∂	∂	UBT	$0,\infty$	
$\operatorname{arcsinh}(x)$	✓	✓	✓	✓		∂	∂	∂	∂	BT	$0,\infty$	
$\operatorname{csch}(x+1)$	✓	✓								IFR	$0,2/(-\mathrm{e}+\mathrm{e}^{-1})$	
$\operatorname{arccsch}(x+1)$	✓	✓	∂	∂		∂	∂	∂	∂		$0,\ln(1+\sqrt{2})$	
$1/\tanh(x+1)$	✓	✓	∂	∂		∂	∂	∂	∂		$1,(\mathrm{e}+\mathrm{e}^{-1})/(\mathrm{e}-\mathrm{e}^{-1})$	
$1/\sinh(x+1)$	✓	✓	∂	∂		∂	∂	∂	∂	BT	$2,2/(\mathrm{e}-\mathrm{e}^{-1})$	
$1/\operatorname{arcsinh}(x+1)$	✓	✓	✓	✓	∂	∂	∂	∂	∂	IFR	$0,1/\ln(1+\sqrt{2})$	
$1/\operatorname{csch}(x)+1$	✓	✓	∂	∂		∞	✓	∂	∂	UBT	$1,\infty$	
$\tanh(x^{-1})$	✓	✓	∂	∂		∂	∂	∂	∂	IFR	$0,1$	
$\operatorname{csch}(x^{-1})$	✓	✓	∂	∂		∂	∂	∂	∂		$1,\infty$	
$\operatorname{arccsch}(x^{-1})$	✓	✓	∂	∂		∂	∂	∂	∂		$0,\infty$	

Legend

Symbol	Meaning
✓	Exists, Closed Form
∂	Exists, Not Closed Form
$\varnothing$	Not Possible
	Not Calculated