

Log Normal Distribution

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

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

Legend

Symbol	Meaning
✓	Exists, Closed Form
∂	Exists, Not Closed Form
∅	Not Possible
	Not Calculated