

Gompertz Distribution

$$f(x) = ab^x e^{-a(b^x - 1)/\ln(b)} \quad x, a, b > 0$$

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

Legend

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