

Verteilungs- Funktionen



SCHRAUSSER

Verteilungs Funktionen

Summarizing presentation of the fundamentally most important distribution functions with distribution graphics and formulation.

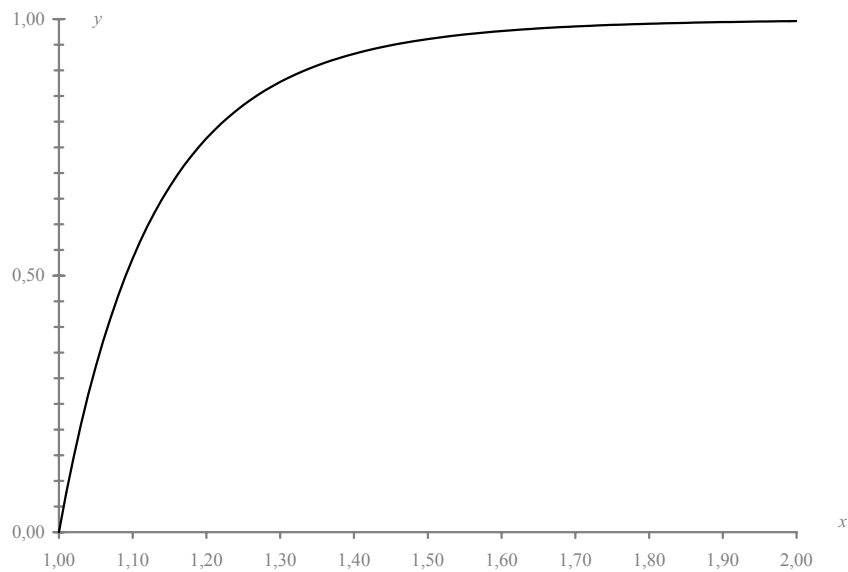
Examples for the calculation in SCHRAUSSER-MAT syntax, as well as an extensive collection of formulas with transformations according to parameters of interest in the appendix.

by Dietmar G. Schrausser
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Pareto Verteilungs Funktion $F(x) = y$

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

wobei
 c = Formparameter

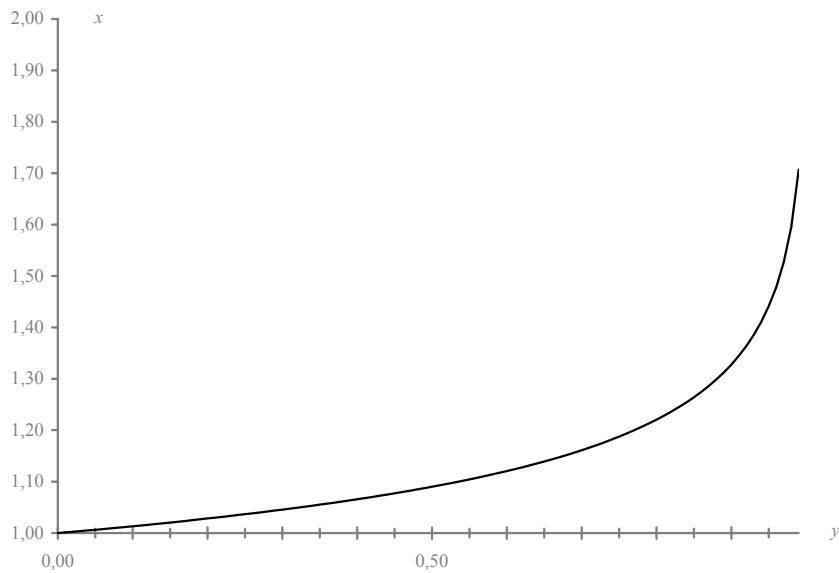


$$c = 8$$

Pareto Verteilungs Funktion $F^{-1}(x) = F(y) = x$

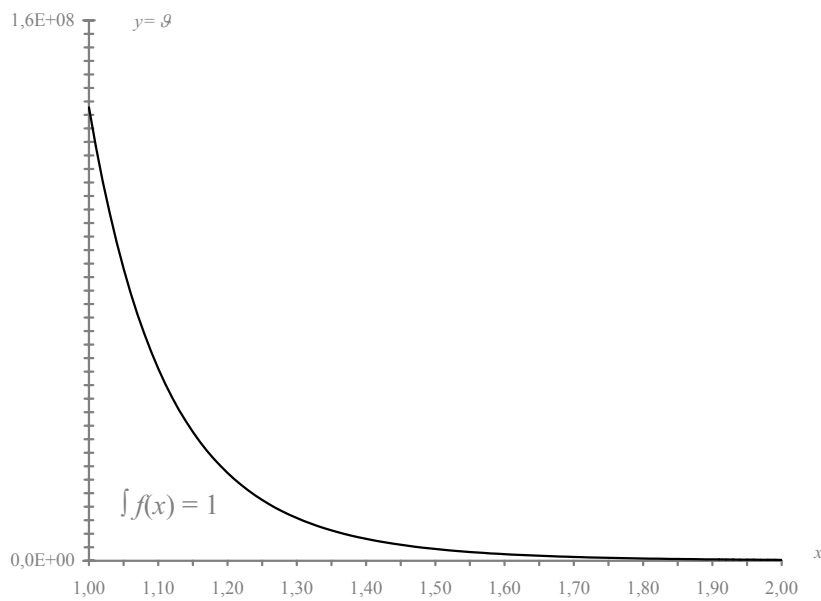
$$F(y) = (1 - y)^{-\frac{1}{c}}$$

wobei
 c = Formparameter



$$c = 8$$

Paretoverteilungs Dichte Funktion $f(x) = \mathcal{P}$



$$f(x) = \left(\frac{c}{x} \right)^{c+1}$$

wobei

$$x \geq 1$$

c = Formparameter

$$c = 8$$

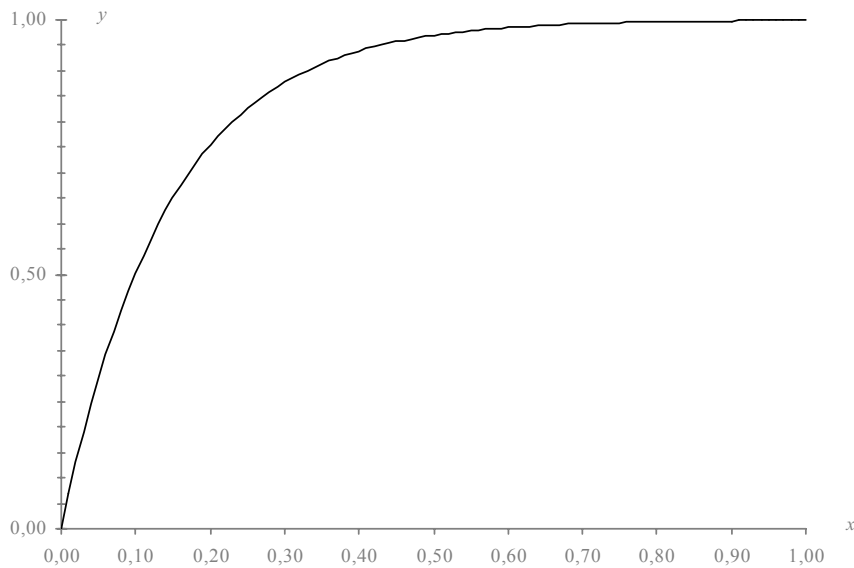
Exponential Verteilungs Funktion $F(x) = y$

$$F(x) = 1 - e^{-\lambda \cdot x}$$

wobei

λ = Skalenparameter

$$b = 1/\lambda$$



$$\lambda = 7$$

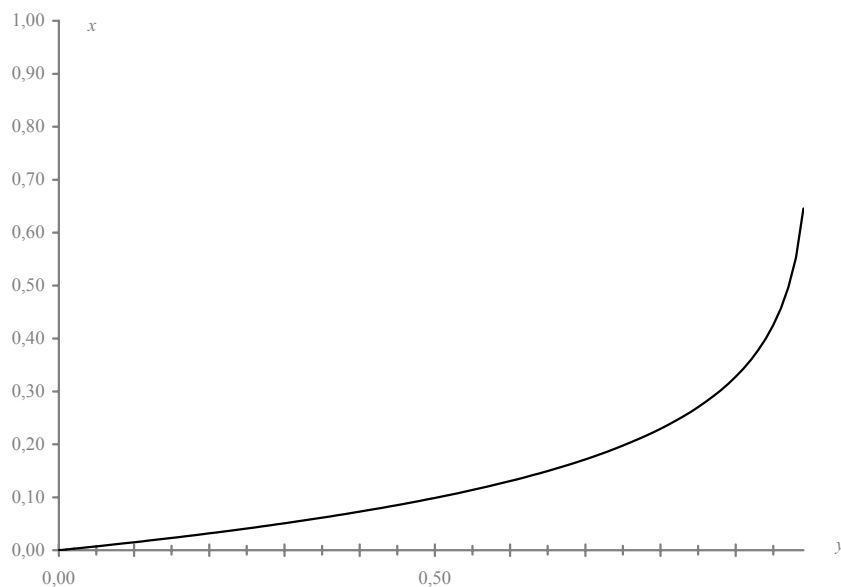
Exponential Verteilungs Funktion $F^{-1}(x) = F(y) = x$

$$F(y) = \frac{1}{\lambda} \cdot \ln(1 - y)^{-1}$$

wobei

λ = Skalenparameter

$$b = 1/\lambda$$



$$\lambda = 7, b = 0.143$$

Exponentialverteilungs Dichte Funktion $f(x) = \mathcal{G}$

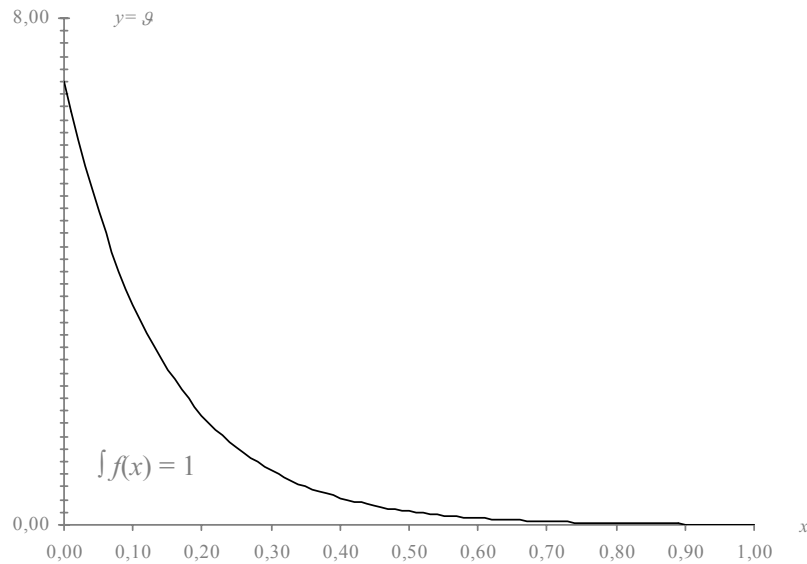
$$f(x) = \lambda \cdot e^{-\lambda \cdot x}$$

wobei

$$0 \leq x < \infty, \lambda > 0$$

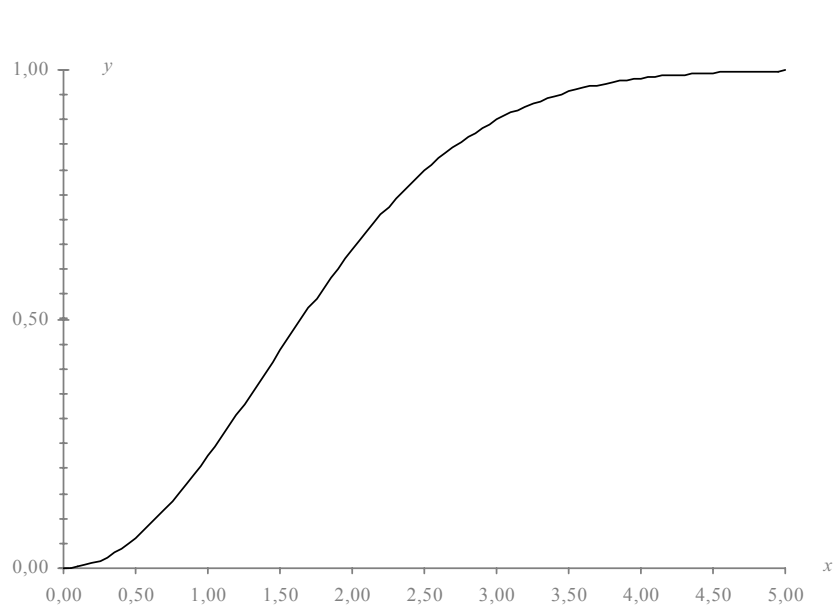
λ = Skalenparameter

$$b = 1/\lambda$$



$$\lambda = 7, b = 0.143$$

Rayleigh Verteilungs Funktion $F(x) = y$

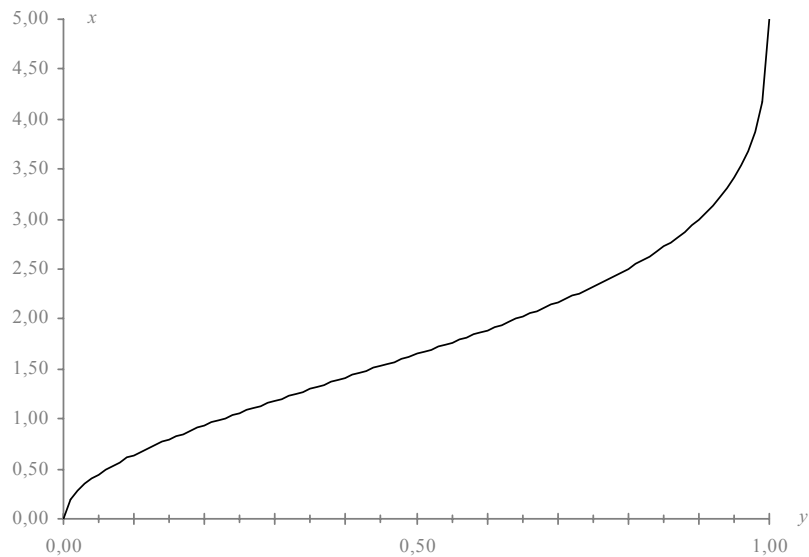


$$F(x) = 1 - e^{-\frac{x^2}{2 \cdot b^2}}$$

wobei
 b = Skalenparameter

$$b = 1.4$$

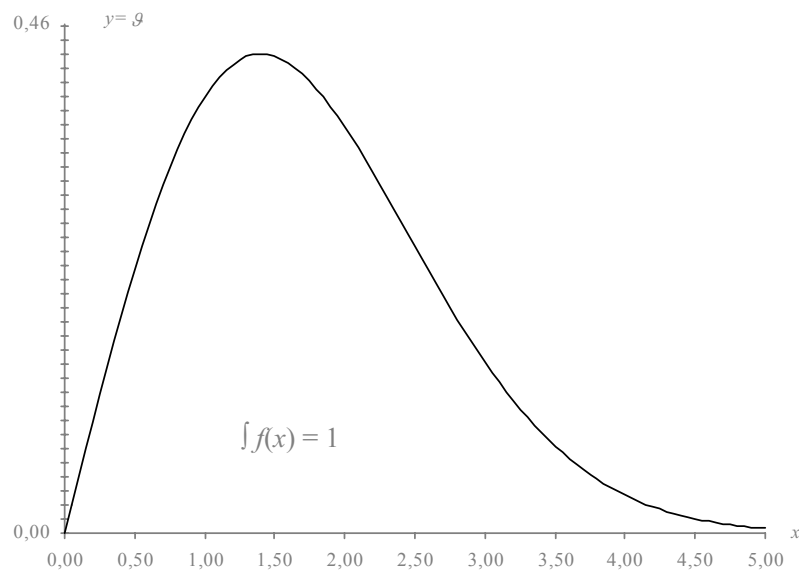
Rayleigh Verteilungs Funktion $F^{-1}(x) = F(y) = x$



$$F(y) = \sqrt{-\ln(1-y) \cdot 2 \cdot b^2}$$

wobei
 b = Skalenparameter

$$b = 1.4$$

Rayleighverteilungs Dichte Funktion $f(x) = \mathcal{G}$ 

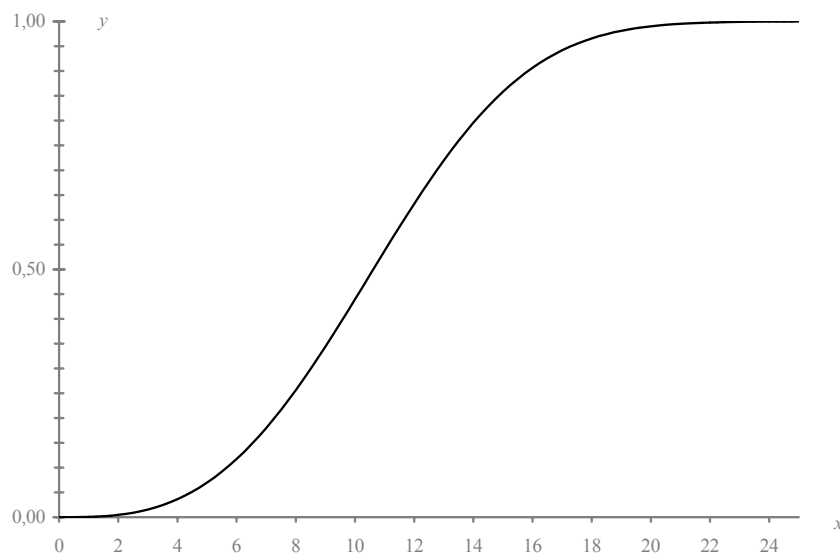
$$f(x) = \frac{x}{b^2} \cdot e^{-\frac{x^2}{2b^2}}$$

wobei

$$0 \leq x < \infty, b > 0$$

b = Skalenparameter

$$b = 1.4$$

Weibull Verteilungs Funktion $F(x) = y$ 

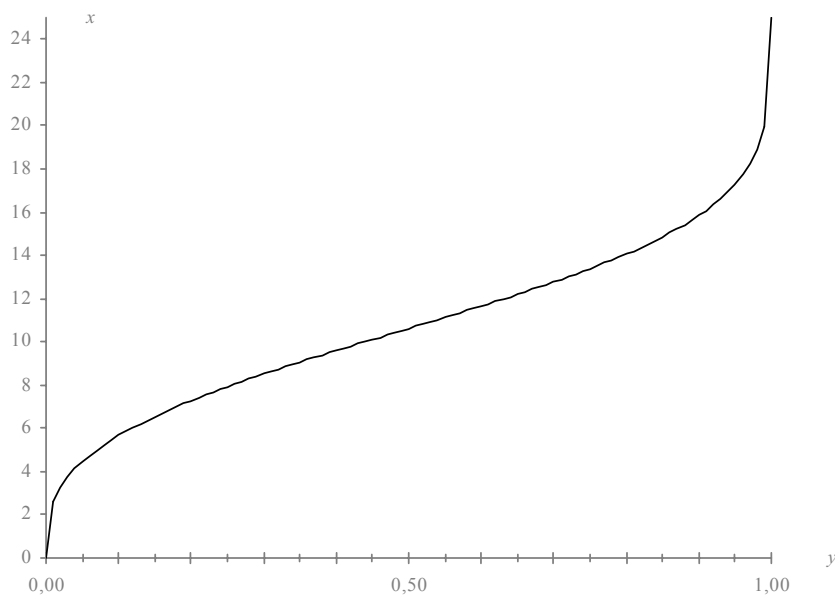
$$F(x) = 1 - e^{-\left(\frac{x}{b}\right)^c}$$

wobei

b = Skalenparameter

c = Formparameter

$$b = 12, c = 3$$

Weibull Verteilungs Funktion $F^{-1}(x) = F(y) = x$ 

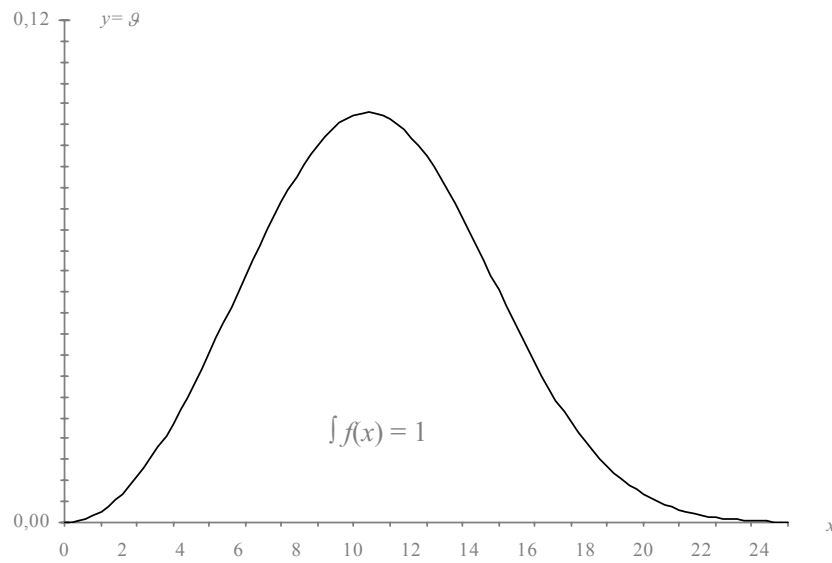
$$F(y) = \sqrt[c]{\ln(1 - y)} \cdot -b$$

wobei

b = Skalenparameter

c = Formparameter

$$b = 12, c = 3$$

Weibullverteilungs Dichte Funktion $f(x) = \mathcal{G}$ 

$$f(x) = \frac{c}{b} \cdot \left(\frac{x}{b}\right)^{c-1} \cdot e^{-\left(\frac{x}{b}\right)^c}$$

wobei

$$0 \leq x < \infty$$

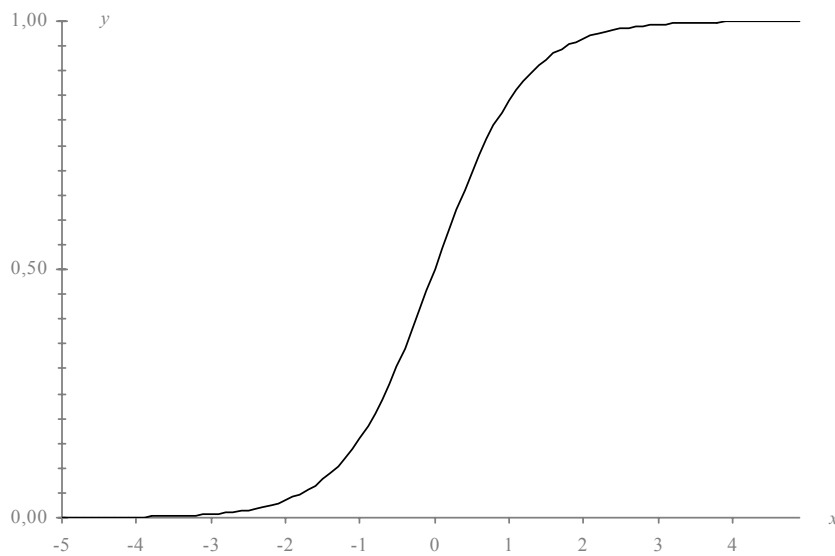
$$b > 0, c > 0$$

b = Skalenparameter

c = Formparameter

$$b = 12, c = 3$$

Logistische Verteilungs Funktion $F(x) = y$



$$F(x) = \left(1 + e^{-\frac{x-a}{b}}\right)^{-1}$$

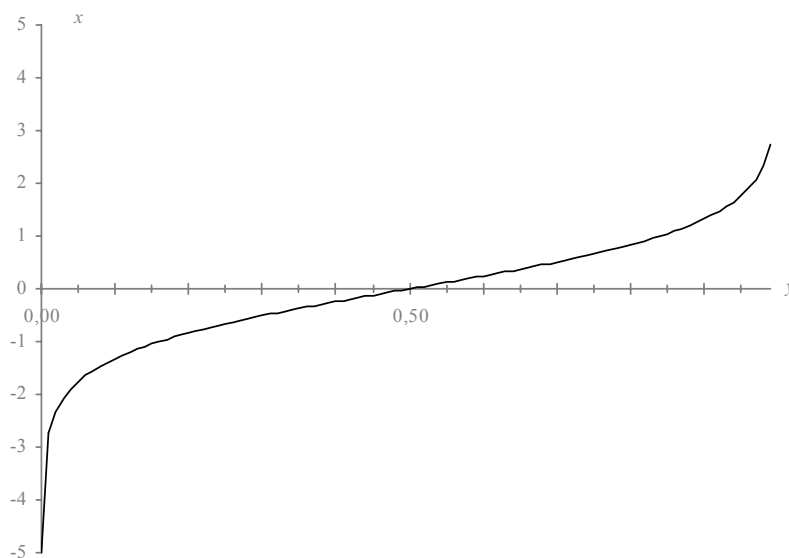
wobei

a = Lageparameter

b = Skalenparameter

$$a = 0, b = 0.6$$

Logistische Verteilungs Funktion $F^{-1}(x) = F(y) = x$



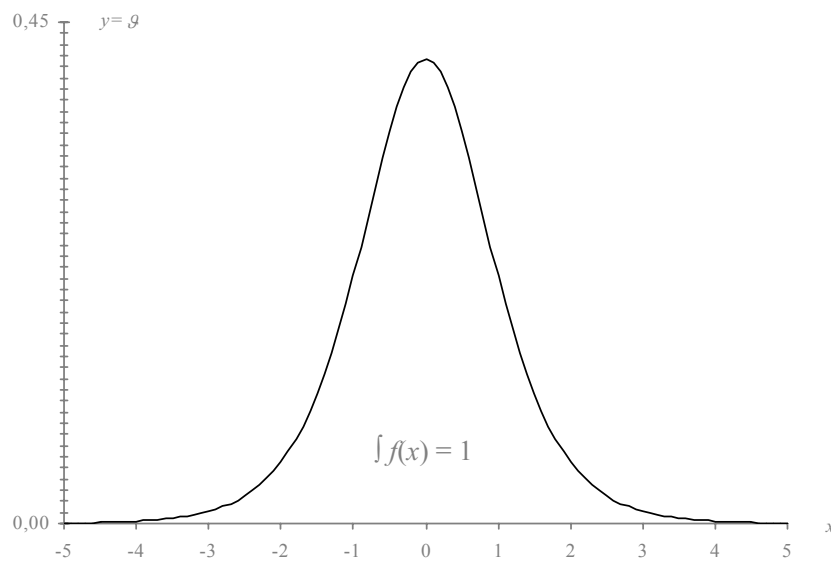
$$F(y) = \ln(y^{-1} - 1)^{-b} + a$$

wobei

a = Lageparameter

b = Skalenparameter

$$a = 0, b = 0.6$$

Logistische Verteilungs Dichte Funktion $f(x) = \mathcal{G}$ 

$$f(x) = \frac{1}{b} \cdot e^{\frac{x-a}{b}} \cdot \left(1 + e^{\frac{x-a}{b}}\right)^{-2}$$

wobei

$$-\infty < x < \infty$$

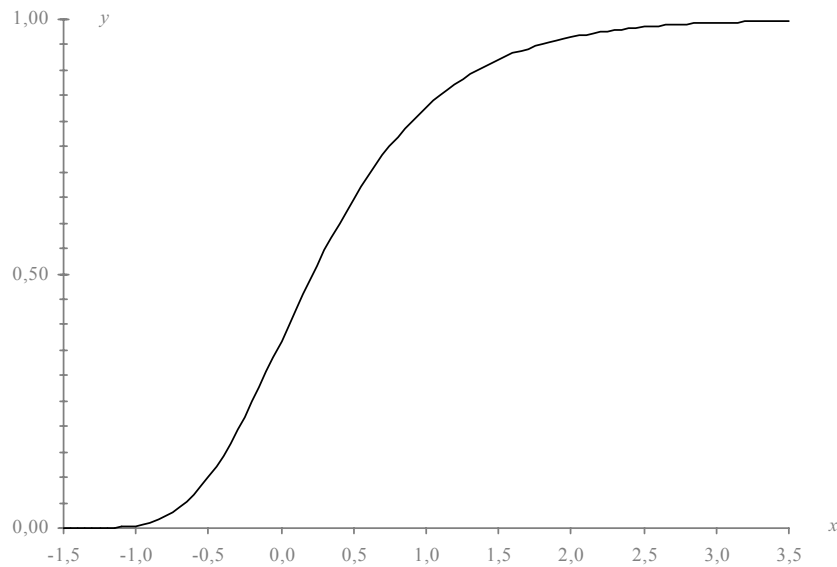
$$b > 0$$

a = Lageparameter

b = Skalenparameter

$$a = 0, b = 0.6$$

Extremwert Verteilungs Funktion $F(x) = y$



$$F(x) = e^{-e^{-\frac{x-a}{b}}}$$

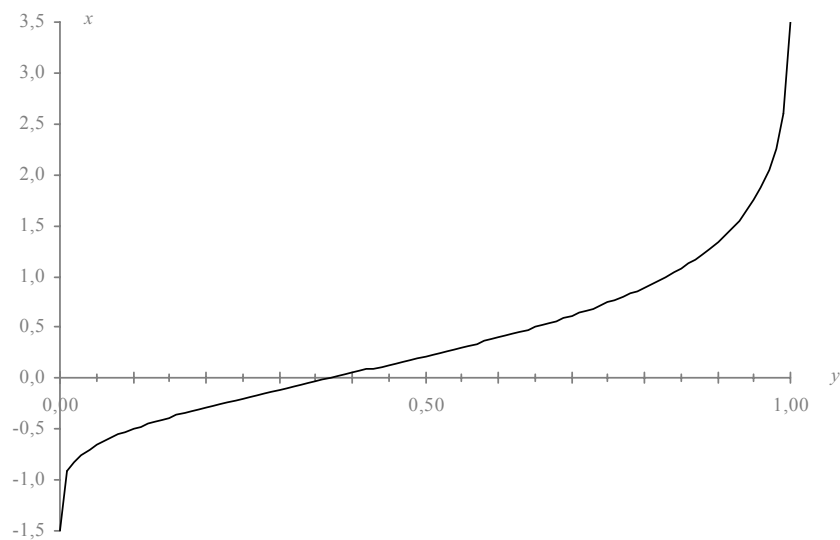
wobei

a = Lageparameter (\bar{x})

b = Skalenparameter

$$a = 0, b = 0.6$$

Extremwert Verteilungs Funktion $F^{-1}(x) = F(y) = x$



$$F(y) = \ln(\ln y^{-1})^{-b} + a$$

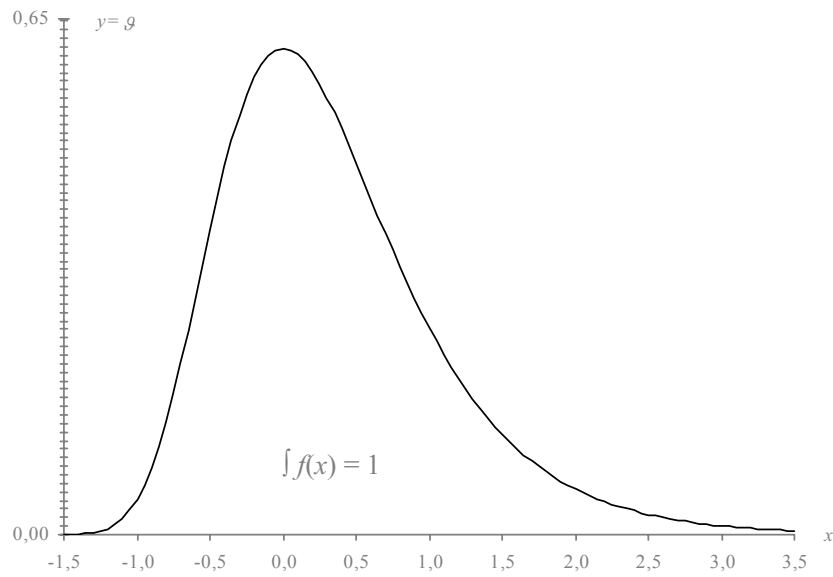
wobei

a = Lageparameter (\bar{x})

b = Skalenparameter

$$a = 0, b = 0.6$$

Extremwertverteilungs Dichte Funktion $f(x) = \mathcal{G}$



$$f(x) = \frac{1}{b} \cdot e^{-\frac{x-a}{b}} \cdot e^{-e^{-\frac{x-a}{b}}}$$

wobei

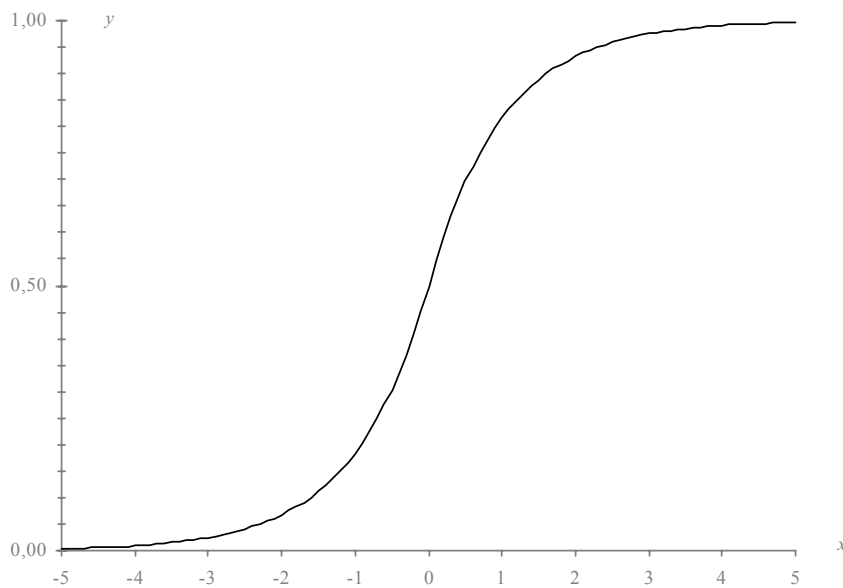
$$-\infty < x < \infty$$

$$b > 0$$

a = Lageparameter (\bar{x})

b = Skalenparameter

$$a = 0, b = 0.6$$

Laplace Verteilungs Funktion $F(x) = y$ 

$$F(x < a) = \frac{1}{2} \cdot e^{-\frac{a-x}{b}},$$

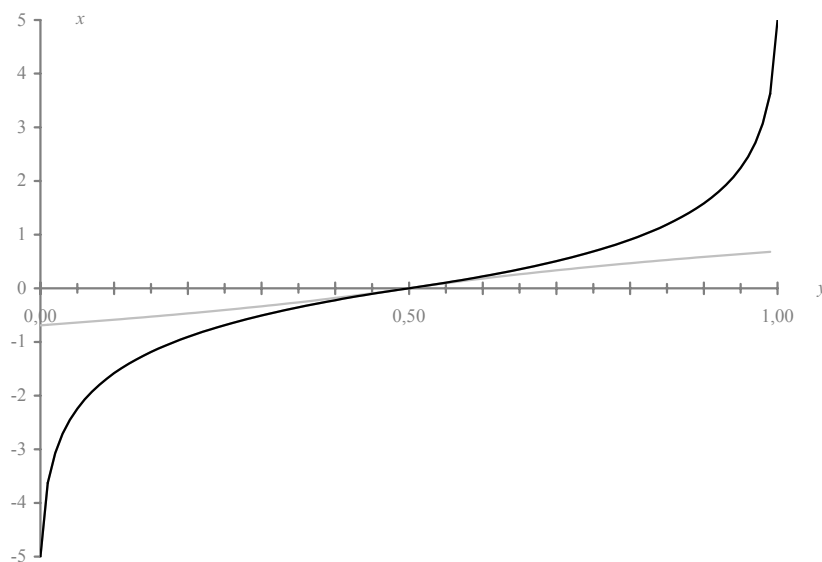
$$F(x \geq a) = 1 - \left(\frac{1}{2} \cdot e^{-\frac{x-a}{b}} \right)$$

wobei

a = Lageparameter (\bar{x})

b = Skalenparameter

$$a = 0, b = 1$$

Laplace Verteilungs Funktion $F^{-1}(x) = F(y) = x$ 

$$F^{-1}(x < a) = a - \log_e(2 \cdot y)^{-b},$$

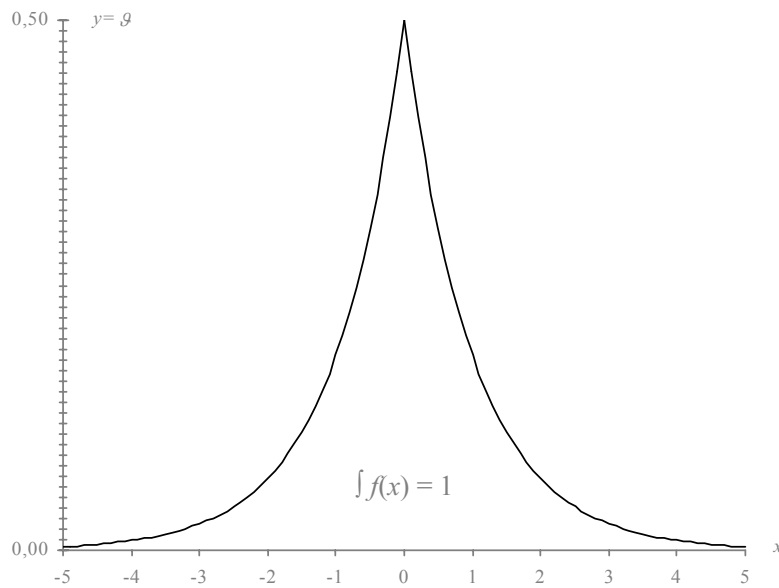
$$F^{-1}(x \geq a) = a + \log_e(2 - 2 \cdot y)^{-b}$$

wobei

a = Lageparameter (\bar{x})

b = Skalenparameter

$$a = 0, b = 1$$

Laplaceverteilungs Dichte Funktion $f(x) = \mathcal{L}$ 

$$f(x) = \frac{1}{2 \cdot b} \cdot e^{-\frac{|x-a|}{b}}$$

wobei

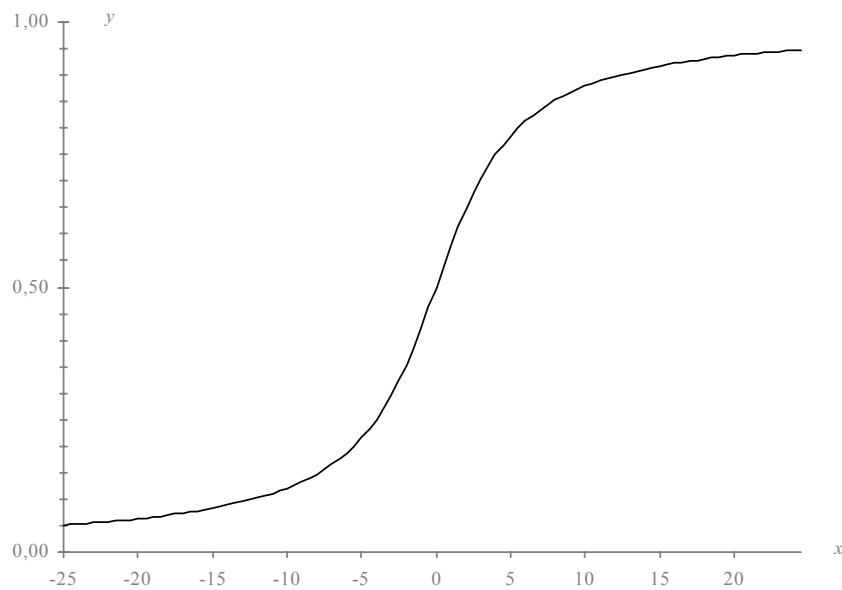
$$-\infty < x < \infty$$

a = Lageparameter (\bar{x})

b = Skalenparameter

$$a = 0, b = 1$$

Cauchy Verteilungs Funktion $F(x) = y$



$$F(x) = \frac{1}{2} + \frac{1}{\pi} \cdot \tan^{-1} \left(\frac{x - \eta}{\theta} \right)$$

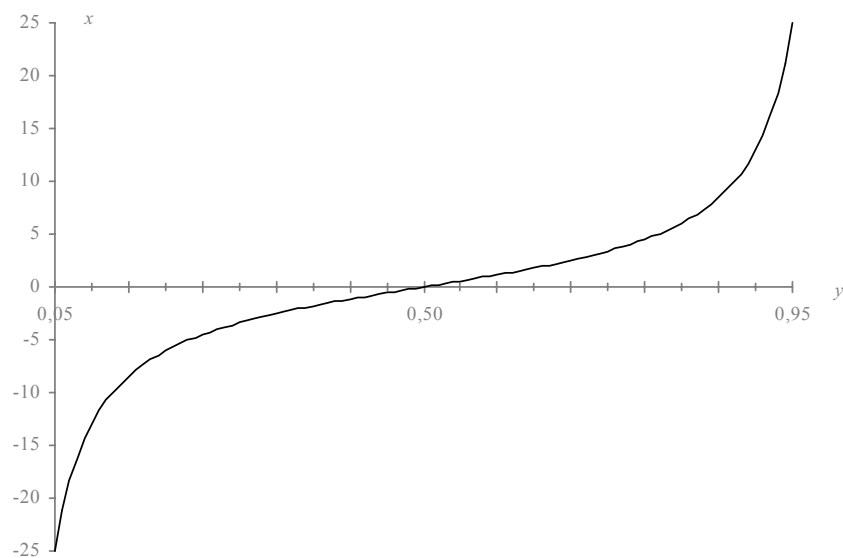
wobei

η = Lageparameter (\tilde{x})

θ = Skalenparameter

$$\eta = 0, \theta = 4$$

Cauchy Verteilungs Funktion $F^{-1}(x) = F(y) = x$



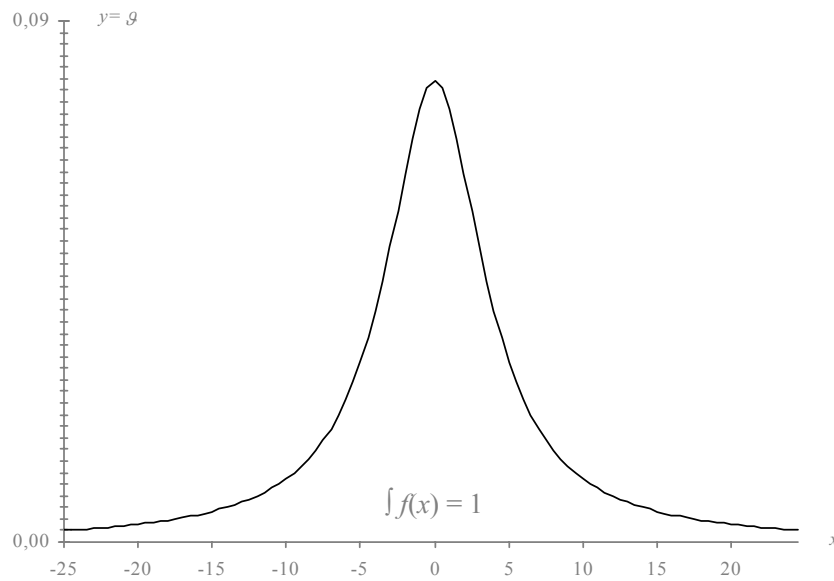
$$F(y) = \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] + \eta$$

wobei

η = Lageparameter (\tilde{x})

θ = Skalenparameter

$$\eta = 0, \theta = 4$$

Cauchyverteilungs Dichte Funktion $f(x) = \mathcal{G}$ 

$$f(x) = \left\{ \theta \cdot \pi \cdot \left[1 + \left(\frac{x - \eta}{\theta} \right)^2 \right] \right\}^{-1}$$

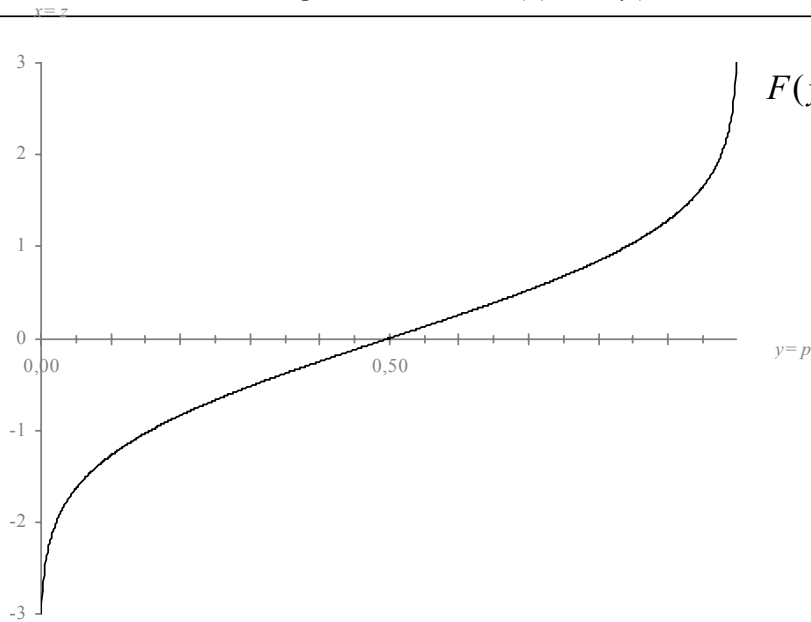
wobei

$\theta > 0$

η = Lageparameter (\tilde{x})

θ = Skalenparameter

$$\eta = 0, \theta = 4$$

Standard-Normalverteilungsfunktion $F^{-1}(x) = F(y) = x$ 

$$F(y) = \sqrt{\sum_{i=1}^9 a_i \cdot (-\log_e[4 \cdot y \cdot (1-y)])^i}$$

wobei

$$a_9 = -0,000000003231081277$$

$$a_8 = 0,00000008360937017$$

$$a_7 = 0,00000104527497$$

$$a_6 = 0,000005824238515$$

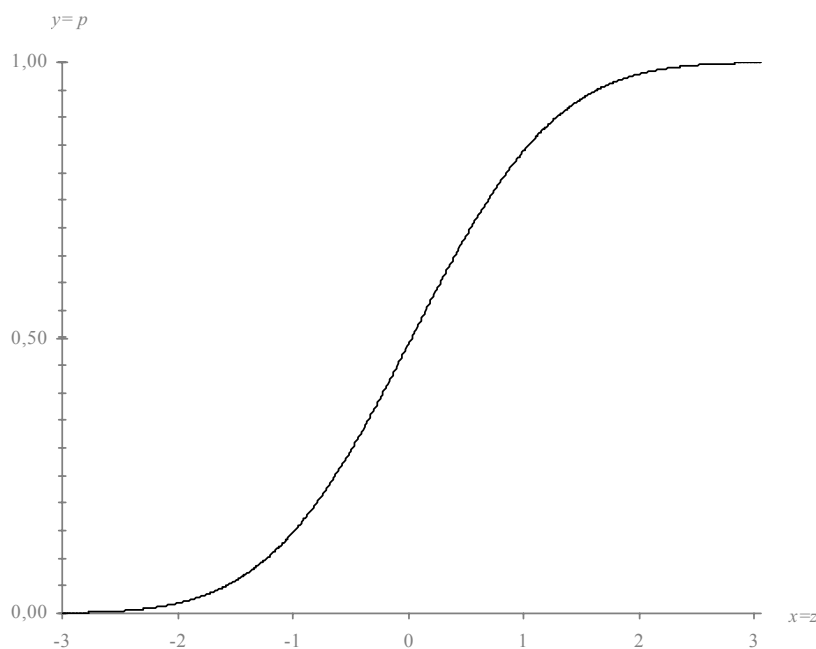
$$a_5 = 0,00000684128299$$

$$a_4 = 0,0002250947176$$

$$a_3 = 0,000836435359$$

$$a_2 = 0,03706987906$$

$$a_1 = 1,570796288$$

Standard-Normalverteilungsfunktion $F(x) = y$ 

$$F_1(x) = \frac{1}{2} \cdot \left[1 + \sum_{i=1}^6 (a_i \cdot |x|^i) \right]^{-16}$$

$$F_2(x) = 1 - \frac{1}{2} \cdot \left[1 + \sum_{i=1}^6 (a_i \cdot |x|^i) \right]^{-16}$$

wobei

$$F_1(x); x < 0$$

$$F_2(x); x \geq 0$$

$$a_4 = 0.0000380036$$

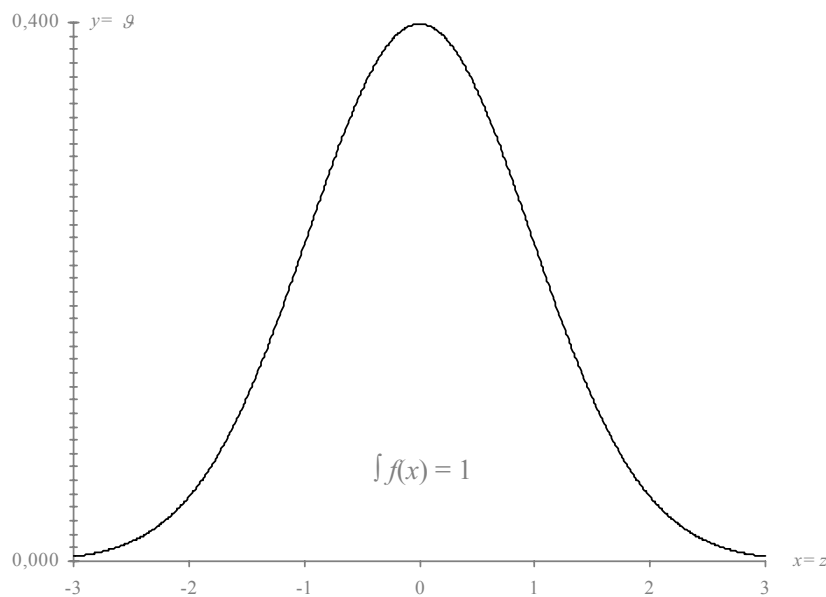
$$a_5 = 0.0000488906$$

$$a_6 = 0.000005383$$

$$a_1 = 0.049867347$$

$$a_2 = 0.021141006$$

$$a_3 = 0.0032776263$$

Standard-Normalverteilungs Dichte Funktion $f(x) = g$ 

$$f(x) = \frac{1}{\sqrt{2 \cdot \pi}} \cdot e^{-\frac{x^2}{2}}$$

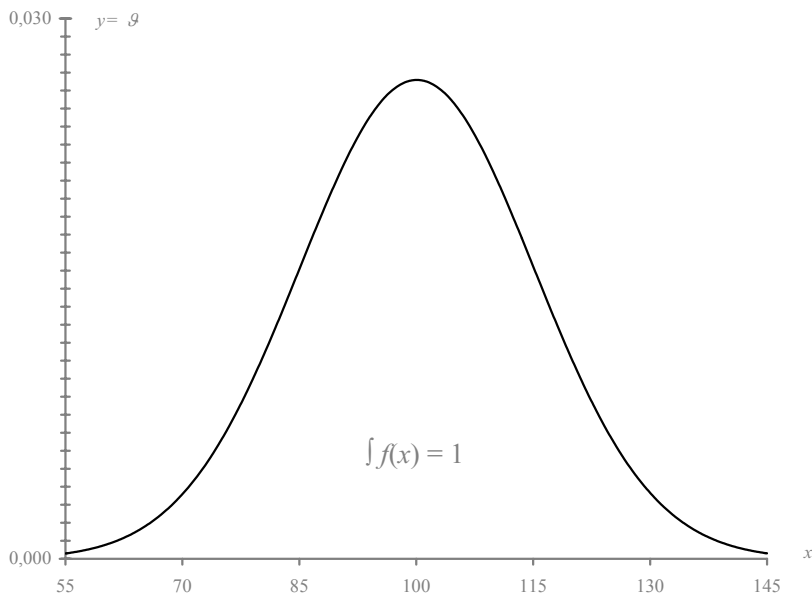
wobei

$$-\infty < x < \infty$$

$$x = 1$$

$$d = \left(\frac{1}{\sqrt{2 \cdot \pi}} \right) \cdot e^{-\frac{x^2}{2}}$$

$$d = \text{DZW } x$$

Normalverteilungs Dichte Funktion $f(x) = g$ 

$$f(x) = \frac{1}{\sqrt{2 \cdot \pi \cdot \sigma}} \cdot e^{-\frac{(x-\mu)^2}{2 \cdot \sigma^2}}$$

wobei

$$-\infty < x < \infty$$

 μ = Lageparameter σ = Skalenparameter

$$x = 145$$

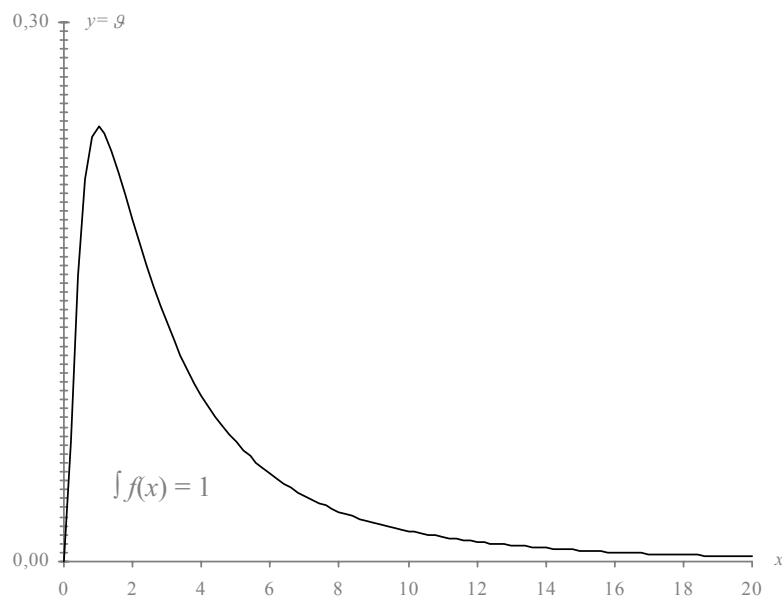
$$m = 100$$

$$s = 15$$

$$d = \left(\frac{1}{\sqrt{2 \cdot \pi \cdot s}} \right) \cdot e^{-\frac{(x-m)^2}{2 \cdot s^2}}$$

$$\mu = 100, \sigma = 15$$

Lognormalverteilungs Dichte Funktion $f(x) = \mathcal{G}$



$$f(x) = \frac{1}{x \cdot \sqrt{2 \cdot \pi \cdot \sigma}} \cdot e^{-\frac{(\log_e x - \mu)^2}{2 \cdot \sigma^2}}$$

wobei

$$0 < x < \infty$$

$$\mu > 0, \sigma > 0$$

μ = Skalenparameter

σ = Formparameter

$$\mu = 1, \sigma = 1$$

$$x = 1$$

$$a = 1$$

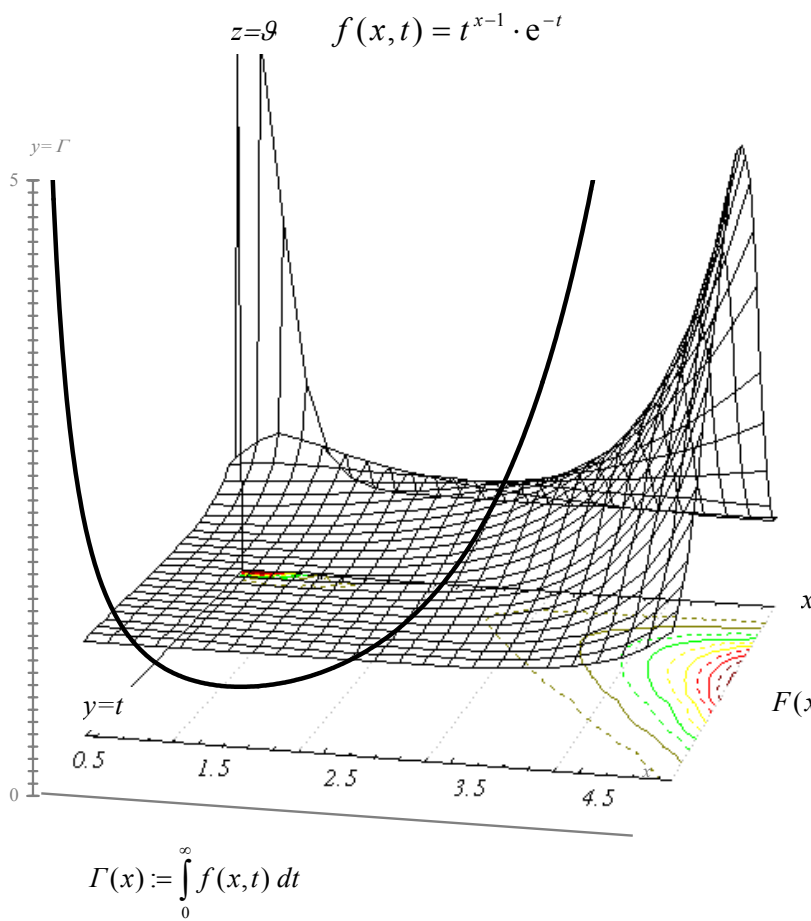
$$b = 1$$

$$d = \left(\frac{1}{x \cdot \sqrt{2 \cdot \pi \cdot b}} \right) \cdot e^{-\frac{(\ln x - a)^2}{2 \cdot b}}$$

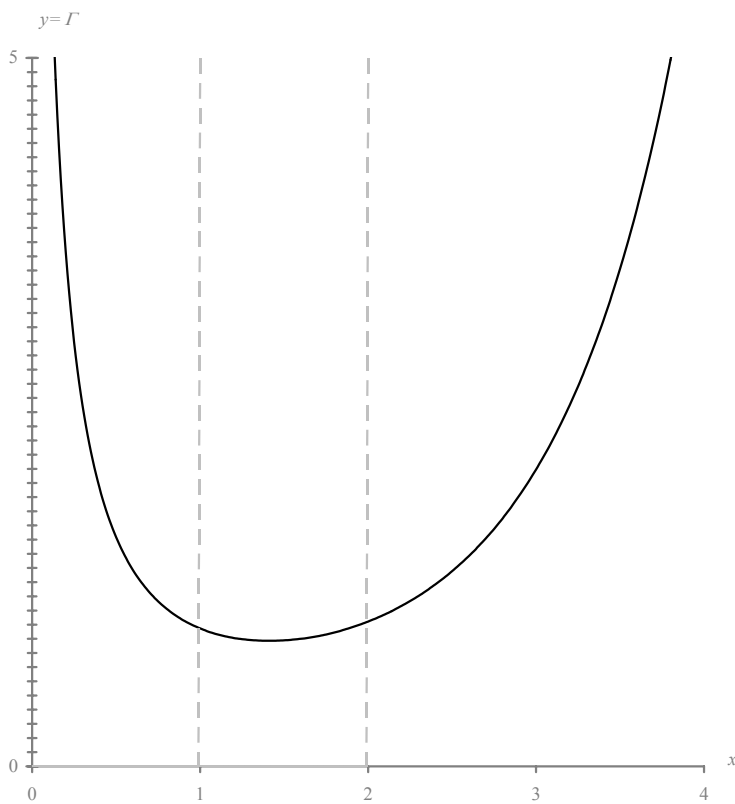
Gamma Funktion $\int f(x,t) dt + c = \Gamma$

$$\Gamma(x) := \int_0^{\infty} t^{x-1} \cdot e^{-t} dt$$

wobei
 $t > 0, x > 0$



$$F(x,t) = \iint f(x,t) dx dt \rightarrow \infty$$

Gamma Polynomial-Approximation $F_n(x) \approx \Gamma$ 

$$F_1(x) = \left| \log_{10} \left\{ x^{-1} \cdot \left[\sum_{i=1}^8 (a_i \cdot x^i) + b \right] \right\} \right|,$$

$$F_2(x) = \log_{10} \left\{ \sum_{i=1}^8 [a_i \cdot (x-1)^i] + b \right\},$$

$$F_3(x) = (x-1)!,$$

$$F_4(x) = \left[\sum_{i=1}^8 (a_i \cdot {}_x r^i) + 1 \right] \cdot \prod_{i=1}^{x-1} [(x-i) + {}_x r]$$

wobei

$F_1(x)$; $x < 1$

$F_2(x)$; $1 \leq x \leq 2$; $x \in \mathbf{R}$

$F_3(x)$; $x \geq 1$; $x \in \mathbf{N}$

$F_4(x)^*$; $x > 2$; $x \notin \mathbf{N}$

${}_x r = \text{Rest von } x$

$a_1 = -0,577191652$

$a_2 = 0,988205891$

$a_3 = -0,897056937$

$a_4 = 0,918206857$

$a_5 = -0,756704078$

$a_6 = 0,482199394$

$a_7 = -0,193527818$

$a_8 = 0,035868343$

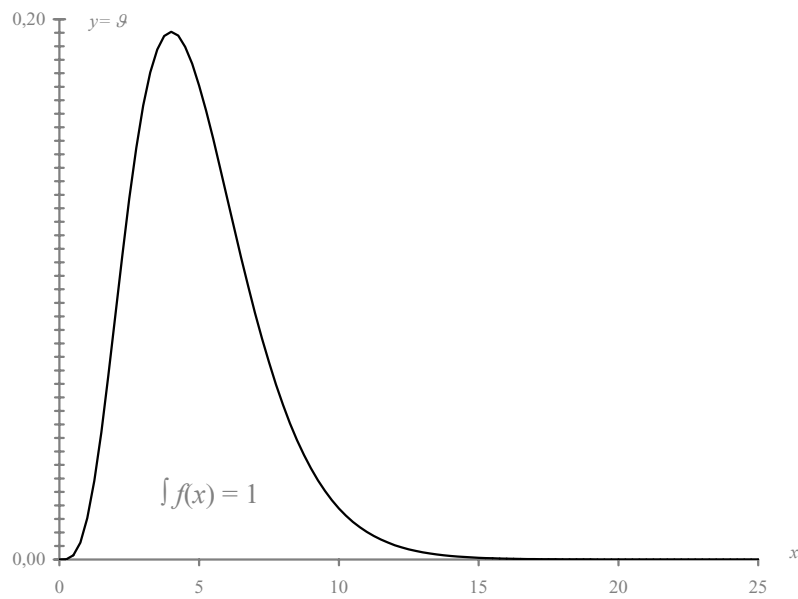
GAMMA 0.5

GAMMA 1.5

GAMMA 2

GAMMA 3.5

* Künstliche Schwankungserzeugung durch Restfunktionsmultiplikation $F({}_x r)$ und Restaddition ${}_x r$.

Gammaverteilungs Dichte Funktion $f(x) = \mathcal{G}$ 

$$f(x) = \frac{1}{\Gamma_{(c)}} \cdot x^{(c-1)} \cdot e^{-x}$$

wobei

$x \geq 0$

$c > 0$

Γ = Gamma

c = Formparameter

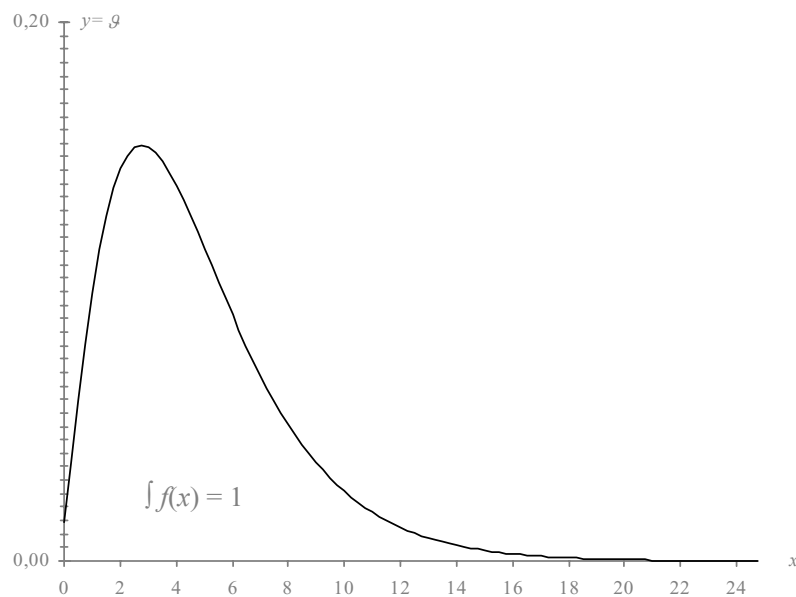
$$c = 5$$

x= 4

c= 5

d= (1 / (GAMMA c)) * xh(c-1) * EUL h-(x)

d- DGAM 4,5

χ^2 -Verteilungs Dichte Funktion $f(x) = g$ 

$$f(x) = \frac{1}{2^{\frac{\nu}{2}} \cdot \Gamma\left(\frac{\nu}{2}\right)} \cdot x^{\left(\frac{\nu}{2}-1\right)} \cdot e^{-\frac{x}{2}}$$

wobei

$x > 0$

$\nu > 0$

Γ = Gamma

ν = Formparameter (df)

$\nu = 5$

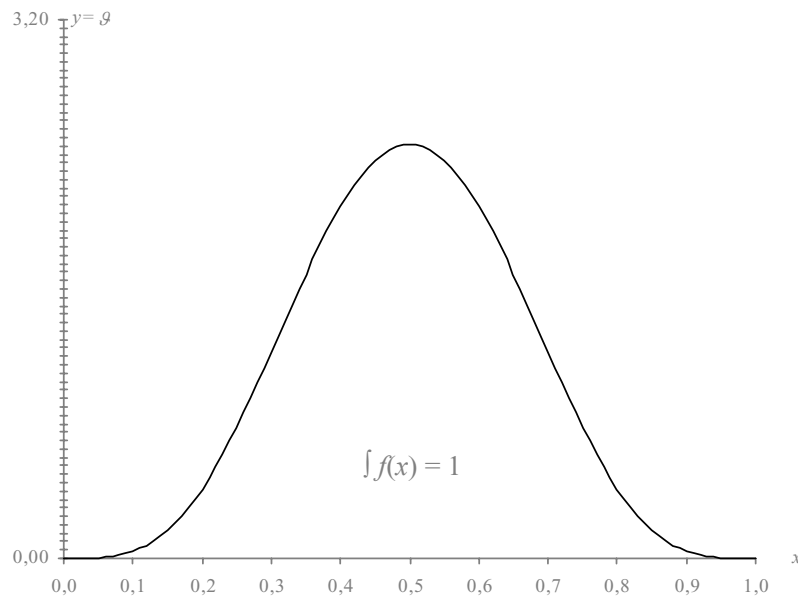
$x = 4$

$b = 5$

$d = (1 / (2 \cdot h(b/2) \cdot \text{GAMMA}(b/2))) \cdot x^{h(b/2-1)} \cdot \text{EUL}h-(x/2)$

d - DXW x, b

Betaverteilungs Dichte Funktion $f(x) = \mathcal{B}$



$$f(x) = \frac{\Gamma_{(\nu+\omega)}}{\Gamma_{(\nu)} \cdot \Gamma_{(\omega)}} \cdot x^{\nu-1} \cdot (1-x)^{\omega-1}$$

wobei

$$0 \leq x \leq 1$$

$$\nu > 0, \omega > 0$$

Γ = Gamma

ν = Formparameter

ω = Formparameter

$$\nu = 5, \omega = 5$$

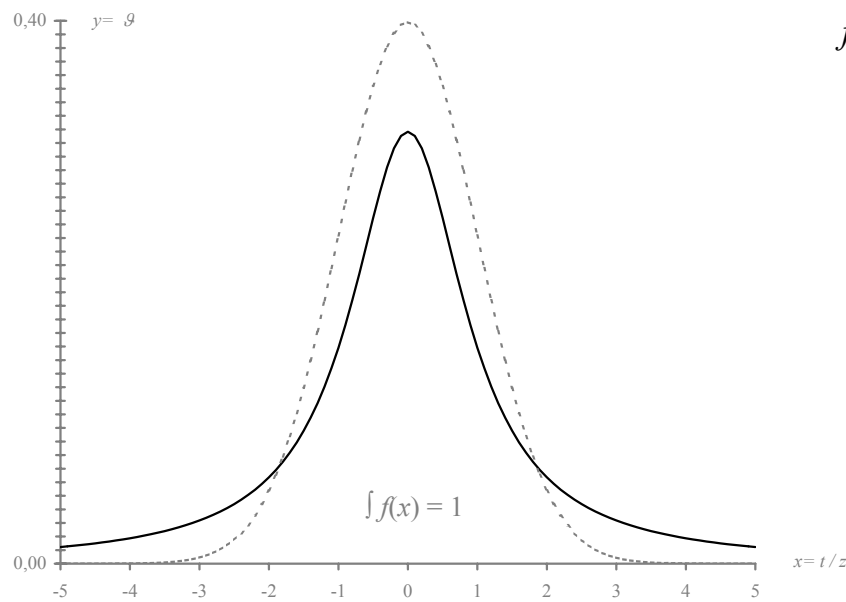
$$x = 0.5$$

$$a = 5$$

$$b = 5$$

$$d = (\text{GAMMA}(a+b) / (\text{GAMMA } a * \text{GAMMA } b)) * x^{a-1} * (1-x)^{b-1}$$

t -Verteilungs Dichte Funktion $f(x) = \mathcal{G}$



$$f(x) = \frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right)} \cdot \nu \cdot \pi^{-\frac{1}{2}} \cdot \left(1 + \frac{x^2}{\nu}\right)^{-\frac{\nu+1}{2}}$$

wobei

$-\infty < x < \infty$

$\nu > 0$

Γ = Gamma

ν = Formparameter (df)

$\nu = 1$

$x = 1$

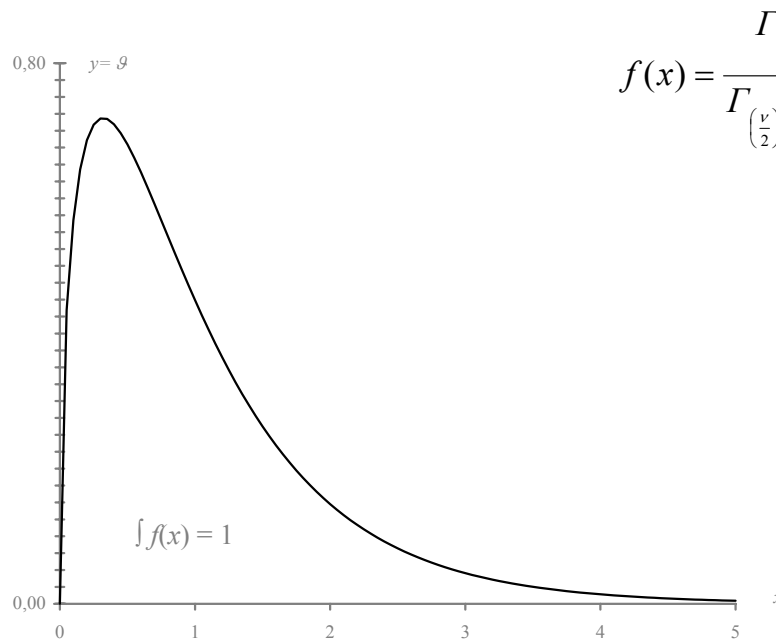
$b = 1$

$d = \text{GAMMA}((b+1)/2) / \text{GAMMA}(b/2) * b * \text{PI_h} - (1/2) * (1 + x^2/b) \text{h} - ((b+1)/2)$

$d = \text{DTW } x, b$

t -Verteilungs Dichte Integral Funktion $F(x) = \int f(x) dx = p$

$$F(x) = \int_{-\infty}^x \frac{\Gamma\left(\frac{n+1}{2}\right)}{\Gamma\left(\frac{n}{2}\right)} \cdot (n \cdot \pi)^{-\frac{1}{2}} \cdot \left(1 + \frac{x^2}{n}\right)^{-\frac{n+1}{2}} dx$$

F-Verteilungs Dichte Funktion $f(x) = \mathcal{F}$ 

$$f(x) = \frac{\Gamma\left(\frac{\nu+\omega}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right) \cdot \Gamma\left(\frac{\omega}{2}\right)} \cdot \left(\frac{\nu}{\omega}\right)^{\frac{\nu}{2}} \cdot x^{\left(\frac{\nu-1}{2}\right)} \cdot \left[1 + \left(\frac{\nu}{\omega}\right) \cdot x\right]^{-\frac{\nu+\omega}{2}}$$

wobei

$x \geq 0$

$\nu > 0, \omega > 0$

Γ = Gamma

ν = Formparameter (df_1)

ω = Formparameter (df_2)

$\nu = 3, \omega = 50$

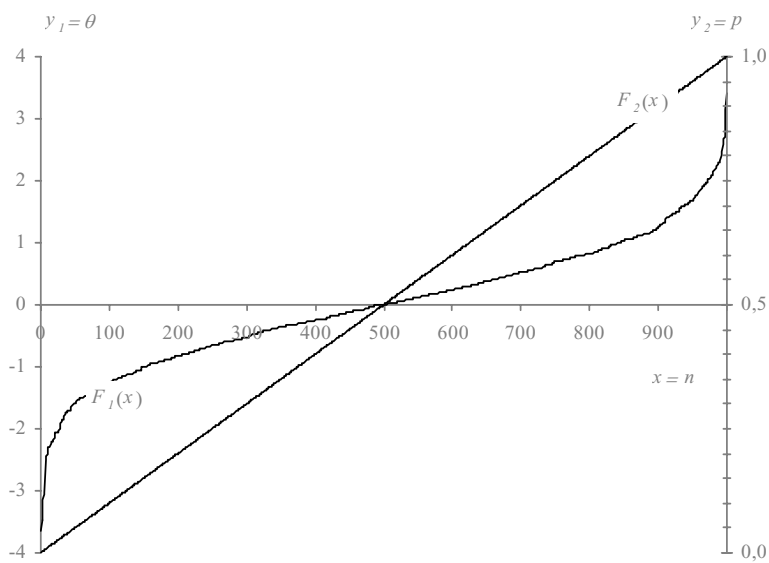
x= 2

a= 3

b=50

d= (GAMMA((a+b)/2) / (GAMMA(a/2) * GAMMA(b/2))) * (a/b) * x^(a/2-1) * (1+(a/b)*x)^(-(a+b)/2)

d- DFW x, a, b

Verteilungs Simulations-Funktion $F(x=n)$ 

$$F_1(x = n) = y_1 = \theta_n \leq \theta_{n+1}$$

$$F_2(x = n) = y_2 = p_{\theta_n} = \frac{n}{M}$$

UVS0,9,2,2, 1000, 123, 15,10, 100, 15, 100, 15, 0.98

θ Funktionsformulierungen

<i>Funktion</i>	$F(x), F(x,y)$	$F^{-1}(x)=F(y), F^{-1}(x,y)=F_n(z)$	<i>Parameter</i>
z	$y = \frac{x-a}{b}$	$x = a + y \cdot b$	$a = \bar{x}, b = \sigma$
t	$y = \frac{x-a}{b}$	$x = a + y \cdot b$	$a = \bar{x}, b = \sigma$
χ^2	$y = \frac{(x-a)^2}{a}$	$x = a + \sqrt{y \cdot a}$	$x = f_b, a = f_e$
F	$z = \frac{x}{y}$	$x = z \cdot y, y = \frac{x}{z}$	$x = \sigma_1^2, y = \sigma_2^2$
r	$z = \frac{a}{x \cdot y}$	$y = \frac{a}{z \cdot x}, x = \frac{a}{z \cdot y}$	$x = \sigma_x, y = \sigma_y, a = \sigma_{xy}^2$
Z	$y = \frac{1}{2} \cdot \log_e \left(\frac{1+x}{1-x} \right)$	$x = \frac{e^{2 \cdot y} - 1}{e^{2 \cdot y} + 1}$	$x = r$

Wahrscheinlichkeits Funktionsformulierung

<i>Funktion</i>	$F(X)$	$F^{-1}(X)=F(Y)$	<i>Parameter</i>
p	$Y = \frac{X}{A}$	$X = Y \cdot A$	$X = k, A = n$

$\theta \rightarrow z$ Funktions-Transformationsformulierungen

<i>Kennwert θ</i>	<i>$F(\theta)$</i>
α_3	$z = \frac{\alpha_3}{\sigma_{\alpha_3}}$
α_4	$z = \frac{\alpha_4}{\sigma_{\alpha_4}}$
Z_r	$z = \frac{Z_r}{\sigma_Z}$
r_{tet}	$z = \frac{r_{tet}}{\sigma_{r_{tet}}}$
r_{bis}	$z = \frac{r_{bis}}{\sigma_{r_{bis}}}$
r_{bisR}	$z = \frac{U - \mu_U}{\sigma_U}$
r_{diff}	$z = \frac{Z_{r_1} - Z_{r_2}}{\sigma_{(Z_1 - Z_2)}}$
$r_{xy \cdot z}$	$z = Z_{r_{xy \cdot z}} \cdot \sqrt{n - 3 - (k - 2)}$
U	$z = \frac{U - \mu_U}{\sigma_U}$
T	$z = \frac{T - \mu_T}{\sigma_T}$
$p_{binomial}$	$z = \frac{b - \frac{b+c}{2}}{\sqrt{\frac{b+c}{4}}}$
$p_{hypergeometrisch}$	$z = \frac{d - n \cdot P_{(d)}}{\sqrt{n \cdot P_{(d)} \cdot (1 - P_{(d)}) - n \cdot (n-1) \cdot P_{(d)} \cdot (P_{(d)} - \hat{P}_{(d)})}}$

$\theta \rightarrow t$ Funktions-Transformationsformulierungen

<i>Kennwert θ</i>	<i>$F(\theta)$</i>	<i>Formparameter df</i>
r	$t = \frac{r \cdot \sqrt{n-2}}{\sqrt{1-r^2}}$	$df = n - 2$
σ_{diff}	$t = \frac{(\sigma_1^2 - \sigma_2^2) \cdot \sqrt{n-2}}{2 \cdot \sqrt{\sigma_1^2 \cdot \sigma_2^2 \cdot (1-r^2)}}$	$df = n - 2$
b	$t = \frac{b_i}{\sqrt{\frac{r_{ii} \cdot (1-R^2)}{n-k-1}}}$	$df = n - k - 1$
\bar{x}_{diff}	$t = \frac{\bar{x}_1 - \bar{x}_2}{\hat{\sigma}_{(\bar{x}_1 - \bar{x}_2)}}$	$df = n_1 + n_2 - 2$
$\bar{x} - y$	$t = \frac{\bar{x} - y}{\sqrt{\frac{\sigma^2}{n-1}}}$	$df = n - 1$
\bar{d}	$t = \frac{\bar{x}_d}{\hat{\sigma}_{x_d}}$	$df = n - 1$

$\theta \rightarrow \chi^2$ Funktions-Transformationsformulierungen

Kennwert θ	$F(\theta)$	Formparameter df
Eindimensional	$\chi^2 = \sum_{j=1}^n \frac{(f_{b(j)} - f_{e(j)})^2}{f_{e(j)}}$	$df = 1$
4-Felder	$\chi^2 = \frac{(a+b+c+d) \cdot (a \cdot d - b \cdot c)^2}{(a+b) \cdot (c+d) \cdot (a+c) \cdot (b+d)}$	$df = 1$
4-Felder kontinuitätskorrigiert	$\chi^2 = \frac{(a+b+c+d) \cdot \left(a \cdot d - b \cdot c - \left(\frac{a+b+c+d}{2} \right) \right)^2}{(a+b) \cdot (c+d) \cdot (a+c) \cdot (b+d)}$	$df = 1$
McNemar	$\chi^2 = \frac{(b-c)^2}{b+c}$	$df = 1$
McNemar kontinuitätskorrigiert	$\chi^2 = \frac{\left(b-c - \frac{1}{2} \right)^2}{b+c}$	$df = 1$
$k \cdot l$ - Felder	$\chi^2 = \sum_{i=1}^k \sum_{j=1}^l \frac{(f_{b(i,j)} - f_{e(i,j)})^2}{f_{e(i,j)}}$	$df = (k-1) \cdot (l-1)$
2^k - Felder (KFA)	$\chi^2 = \sum_{i_1=1}^2 \dots \sum_{i_k=1}^2 \frac{(f_{b(i_1 \dots i_k)} - f_{e(i_1 \dots i_k)})^2}{f_{e(i_1 \dots i_k)}}, f_{e(i_1 \dots i_k)} = \frac{\prod_{i=1}^{2k} S_i}{n^{(k-1)}}$	$df = 2^k - k - 1$
2^k - Felder bei 4-Felder Randfrequenzfixierung	$\chi^2 = \sum_{i=1}^k \frac{n_i \cdot (f_{i_1} \cdot f_{i_4} - f_{i_2} \cdot f_{i_3})^2}{(f_{i_1} + f_{i_2}) \cdot (f_{i_3} + f_{i_4}) \cdot (f_{i_1} + f_{i_3}) \cdot (f_{i_2} + f_{i_4})}$	$df = k - 1$

$\theta \rightarrow F$ Funktions-Transformationsformulierungen
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<i>Kennwert θ</i>	<i>$F(\theta)$</i>	<i>Formparameter df_1</i>	<i>Formparameter df_2</i>
R	$F = \frac{R^2 \cdot (n - k - 1)}{(1 - R^2) \cdot k}$	$df_1 = k$	$df_2 = n - k - 1$
$R_{c,A \cdot B}$ $R_{c,(A \cdot B)}$	$F = \frac{\frac{R_{c,AB}^2 - R_{c,B}^2}{k}}{\frac{1 - R_{c,AB}^2}{n - k - p - 1}}$	$df_1 = k$	$df_2 = n - k - p - 1$

GAMMA Γ

<i>Funktion</i>	<i>$F(x,t) = \int f(x,t) dt + c$</i>	<i>$F'(x,t) = f(x,t)$</i>
<i>Gamma</i>	$\Gamma = \int_0^{\infty} t^{x-1} \cdot e^{-t}$	$\mathcal{G} = t^{x-1} \cdot e^{-t}$

θ Verteilungs-Funktionsformulierungen in Potenzschreibweise			
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<i>Funktion</i>	$F(x)=\int f(x) \, dx+c$	$F^I(x)=F(y)$	$F'(x)=f(x)$
<i>Pareto</i>	$y = 1 - x^{-c}$	$x = (1 - y)^{-\frac{1}{c}}$	$\mathcal{G} = \left(\frac{c}{x}\right)^{c+1}$
<i>Exponential</i>	$y = 1 - e^{-\lambda \cdot x}$	$x = \frac{1}{\lambda} \cdot \log_e(1 - y)^{-1}$	$\mathcal{G} = \lambda \cdot e^{-\lambda \cdot x}$
<i>Rayleigh</i>	$y = 1 - e^{-\frac{x^2}{2 \cdot b^2}}$	$x = \sqrt{-\log_e(1 - y) \cdot 2 \cdot b^2}$	$\mathcal{G} = \frac{x}{b^2} \cdot e^{-\frac{x^2}{2 \cdot b^2}}$
<i>Weibull</i>	$y = 1 - e^{-\left(\frac{x}{b}\right)^c}$	$x = \sqrt[c]{\log_e(1 - y)} \cdot -b$	$\mathcal{G} = \frac{c}{b} \cdot \left(\frac{x}{b}\right)^{c-1} \cdot e^{-\left(\frac{x}{b}\right)^c}$
<i>Logistisch</i>	$y = \left(1 + e^{-\frac{x-a}{b}}\right)^{-1}$	$x = \log_e(y^{-1} - 1)^{-b} + a$	$\mathcal{G} = \frac{1}{b} \cdot e^{-\frac{x-a}{b}} \cdot \left(1 + e^{-\frac{x-a}{b}}\right)^{-2}$
<i>Extremwert</i>	$y = e^{-e^{-\frac{x-a}{b}}}$	$x = \log_e(\log_e y^{-1})^{-b} + a$	$\mathcal{G} = \frac{1}{b} \cdot e^{-\frac{x-a}{b}} \cdot e^{-e^{-\frac{x-a}{b}}}$
<i>Laplace</i>	$1) y = \frac{1}{2} \cdot e^{-\frac{a-x}{b}}$ $2) y = 1 - \left(\frac{1}{2} \cdot e^{-\frac{x-a}{b}}\right)$	$1) x = a - \log_e(2 \cdot y)^{-b}$ $2) x = a + \log_e(2 - 2 \cdot y)^{-b}$	$\mathcal{G} = \frac{1}{2 \cdot b} \cdot e^{-\frac{ x-a }{b}}$
<i>Cauchy</i>	$y = \frac{1}{2} + \frac{1}{\pi} \cdot \tan^{-1}\left(\frac{x-\eta}{\theta}\right)$	$x = \theta \cdot \tan\left[\left(y - \frac{1}{2}\right) \cdot \pi\right] + \eta$	$\mathcal{G} = \left\{ \theta \cdot \pi \cdot \left[1 + \left(\frac{x-\eta}{\theta}\right)^2\right]\right\}$
<i>Normal</i>	$y = \int_{-\infty}^x \frac{1}{\sqrt{2 \cdot \pi} \cdot \sigma} \cdot e^{-\frac{(x-\mu)^2}{2 \cdot \sigma^2}}$		$\mathcal{G} = \frac{1}{\sqrt{2 \cdot \pi} \cdot \sigma} \cdot e^{-\frac{(x-\mu)^2}{2 \cdot \sigma^2}}$
<i>Lognormal</i>	$y = \int_0^x \frac{1}{x \cdot \sqrt{2 \cdot \pi} \cdot \sigma} \cdot e^{-\frac{(\log_e x - \mu)^2}{2 \cdot \sigma^2}}$		$\mathcal{G} = \frac{1}{x \cdot \sqrt{2 \cdot \pi} \cdot \sigma} \cdot e^{-\frac{(\log_e x - \mu)^2}{2 \cdot \sigma^2}}$
Γ_g	$y = \int \frac{1}{\Gamma_{(c)}} \cdot x^{(c-1)} \cdot e^{-x}$		$\mathcal{G} = \frac{1}{\Gamma_{(c)}} \cdot x^{(c-1)} \cdot e^{-x}$
χ^2	$y = \int_0^x \frac{1}{2^{\frac{\nu}{2}} \cdot \Gamma\left(\frac{\nu}{2}\right)} \cdot x^{\left(\frac{\nu-1}{2}\right)} \cdot e^{-\frac{x}{2}}$		$\mathcal{G} = \frac{1}{2^{\frac{\nu}{2}} \cdot \Gamma\left(\frac{\nu}{2}\right)} \cdot x^{\left(\frac{\nu-1}{2}\right)} \cdot e^{-\frac{x}{2}}$
<i>Beta</i>	$y = \int \frac{\Gamma_{(\nu+\omega)}}{\Gamma_{(\nu)} \cdot \Gamma_{(\omega)}} \cdot x^{\nu-1} \cdot (1-x)^{\omega-1}$		$\mathcal{G} = \frac{\Gamma_{(\nu+\omega)}}{\Gamma_{(\nu)} \cdot \Gamma_{(\omega)}} \cdot x^{\nu-1} \cdot (1-x)^{\omega-1}$
t	$y = \int_{-\infty}^x \frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right)} \cdot \nu \cdot \pi^{-\frac{1}{2}} \cdot \left(1 + \frac{x^2}{\nu}\right)^{-\frac{\nu+1}{2}}$		$\mathcal{G} = \frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right)} \cdot \nu \cdot \pi^{-\frac{1}{2}} \cdot \left(1 + \frac{x^2}{\nu}\right)^{-\frac{\nu+1}{2}}$
F	$y = \int_0^x f(x)$		$\mathcal{G} = \frac{\Gamma\left(\frac{\nu+\omega}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right) \cdot \Gamma\left(\frac{\omega}{2}\right)} \cdot \left(\frac{\nu}{\omega}\right)^{\frac{\nu}{2}} \cdot x^{\left(\frac{\nu-1}{2}\right)} \cdot \left[1 + \left(\frac{\nu}{\omega}\right) \cdot x\right]^{-\frac{\nu}{2}}$

¹0 Verteilungs-Funktionsformulierungen in Bruchschreibweise

<i>Funktion</i>	$F(x) = \int f(x) dx + c$	$F^{-1}(x) = F(y)$	$F'(x) = f(x)$
<i>Pareto</i>	$y = 1 - \frac{1}{x^c}$	$x = \frac{1}{\sqrt[c]{1-y}}$	$g = \left(\frac{c}{x}\right)^{c+1}$
<i>Exponential</i>	$y = 1 - \frac{1}{e^{\lambda \cdot x}}$	$x = \frac{1}{\lambda} \cdot \log_e \frac{1}{1-y}$	$g = \lambda \cdot \frac{1}{e^{\lambda \cdot x}}$
<i>Rayleigh</i>	$y = 1 - \frac{1}{2 \cdot b^2 \sqrt{e^{x^2}}}$	$x = \sqrt{-\log_e(1-y) \cdot 2 \cdot b^2}$	$g = \frac{x}{b^2} \cdot \frac{1}{2 \cdot b^2 \sqrt{e^{x^2}}}$
<i>Weibull</i>	$y = 1 - \frac{1}{\sqrt[b^c]{e^{x^c}}}$	$x = \sqrt[c]{\log_e(1-y)} \cdot -b$	$g = \frac{c}{b} \cdot \left(\frac{x}{b}\right)^{c-1} \cdot \frac{1}{\sqrt[b^c]{e^{x^c}}}$
<i>Logistisch</i>	$y = \frac{1}{1 + \frac{1}{\sqrt[b]{e^{x-a}}}}$	$x = \log_e \left(\frac{1}{\frac{1}{y} - 1} \right)^b + a$	$g = \frac{1}{b} \cdot \frac{1}{\sqrt[b]{e^{x-a}}} \cdot \frac{1}{\left(1 + \frac{1}{\sqrt[b]{e^{x-a}}}\right)^2}$
<i>Extremwert</i>	$y = \frac{1}{\sqrt[b]{e^{x-a}}}$	$x = \log_e \left(\frac{1}{\log_e \frac{1}{y}} \right)^b + a$	$g = \frac{1}{b} \cdot \frac{1}{\sqrt[b]{e^{x-a}}} \cdot \frac{1}{\sqrt[b]{e^{x-a}}}$
<i>Laplace</i>	$1) y = \frac{1}{2} \cdot \frac{1}{\sqrt[b]{e^{a-x}}}$	$1) x = a - \log_e \left(\frac{1}{2 \cdot y} \right)^b$	$g = \frac{1}{2 \cdot b} \cdot \frac{1}{\sqrt[b]{e^{ x-a }}}$
	$2) y = 1 - \left(\frac{1}{2} \cdot \frac{1}{\sqrt[b]{e^{x-a}}} \right)$	$2) x = a + \log_e \left(\frac{1}{2 - 2 \cdot y} \right)^b$	
<i>Cauchy</i>	$y = \frac{1}{2} + \frac{1}{\pi} \cdot \tan^{-1} \left(\frac{x-\eta}{\theta} \right)$	$x = \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] + \eta$	$g = \frac{1}{\theta \cdot \pi \cdot \left[1 + \left(\frac{x-\eta}{\theta} \right)^2 \right]}$

¹⁾ $x < a$ ²⁾ $x \geq a$

Wahrscheinlichkeits Verteilungs-Funktionsformulierungen

<i>Funktion</i>	$F(X)=\sum f(X)=p$	$F^{-1}(X)=F(Y)$	$f(X=k)=P$
<i>Gleich</i>	$Y = \sum_{i=1}^X \frac{1}{i}$		$Y = \frac{1}{X}$
<i>Bernulli</i>	$Y = \sum_{i=0}^X p^i \cdot q^{1-i}$		$Y = p^k \cdot q^{1-k}$
<i>Binomial</i>	$Y = \sum_{i=0}^X \frac{n!}{i! \cdot (n-i)!} \cdot p^i \cdot q^{(n-i)}$		$Y = \frac{n!}{k! \cdot (n-k)!} \cdot p^k \cdot q^{(n-k)}$
<i>Poisson</i>	$Y = \sum_{i=0}^X \frac{(n \cdot p)^i}{e^{(n \cdot p)} i!}$		$Y = \frac{(n \cdot p)^k}{e^{(n \cdot p)} k!}$
<i>Multinomial</i>			$Y = \frac{n!}{\prod_{i=1}^s k_i!} \prod_{i=1}^s p_i^{k_i}$
<i>Hypergeometrisch</i>	$Y = \sum_{i=0}^X \frac{\binom{K}{i} \cdot \binom{N-K}{n-i}}{\binom{N}{n}}$		$Y = \frac{\binom{K}{k} \cdot \binom{N-K}{n-k}}{\binom{N}{n}}$
<i>Geometrisch</i>	$Y = \sum_{i=0}^X p \cdot q^i$		$Y = p \cdot q^k$
<i>Speziell-Additiv</i>	$Y = 1 - (1-p)^X$		
<i>Negativ-Binomial</i>	$Y = \sum_{i=0}^X \binom{k+r-1}{k+r-i} \cdot p^k \cdot q^{r+k-i}$		$Y = \frac{(k+r-1)!}{r! \cdot (k-1)!} \cdot p^k \cdot q^r$

Logistische Funktion

$$F(x) = \left(1 + e^{-\frac{x-a}{b}}\right)^{-1}$$

Logistische Funktion aufgelöst nach x

$$y = \left(1 + e^{-\frac{x-a}{b}}\right)^{-1} \longrightarrow y = \frac{1}{\left(1 + e^{-\frac{x-a}{b}}\right)} \longrightarrow \frac{1}{y} = 1 + e^{-\frac{x-a}{b}} \longrightarrow \frac{1}{y} - 1 = e^{-\frac{x-a}{b}}$$

$$\frac{1}{y} - 1 = \frac{1}{b\sqrt[b]{e^{(x-a)}}} \longrightarrow \frac{1}{\left(\frac{1}{y} - 1\right)} = \sqrt[b]{e^{(x-a)}} \longrightarrow \left(\frac{1}{\left(\frac{1}{y} - 1\right)}\right)^b = e^{(x-a)}$$

$$\left(\frac{1}{\left(\frac{1}{y} - 1\right)}\right)^b = e^{(x-a)} \longrightarrow \log_e \left(\frac{1}{\left(\frac{1}{y} - 1\right)}\right)^b = x - a$$

$$\log_e \left(\frac{1}{\left(\frac{1}{y} - 1\right)}\right)^b + a = x$$

$$F^{-1}(x) = F(y) = x = \log_e \left(\frac{1}{y^{-1} - 1}\right)^b + a$$

Logistische Funktion aufgelöst nach a

$$y = \left(1 + e^{-\frac{x-a}{b}}\right)^{-1} \longrightarrow y = \frac{1}{\left(1 + e^{-\frac{x-a}{b}}\right)} \longrightarrow \frac{1}{y} = 1 + e^{-\frac{x-a}{b}} \longrightarrow \frac{1}{y} - 1 = e^{-\frac{x-a}{b}}$$

$$\frac{1}{y} - 1 = \frac{1}{b\sqrt[b]{e^{(x-a)}}} \longrightarrow \frac{1}{\left(\frac{1}{y} - 1\right)} = \sqrt[b]{e^{(x-a)}} \longrightarrow \left[\frac{1}{\left(\frac{1}{y} - 1\right)}\right]^b = e^{(x-a)}$$

$$\log_e \left[\frac{1}{\left(\frac{1}{y} - 1\right)}\right]^b = x - a \longrightarrow x - \log_e \left[\frac{1}{\left(\frac{1}{y} - 1\right)}\right]^b = a$$

Logistische Funktion aufgelöst nach b

$$\frac{1}{y} - 1 = \frac{1}{b\sqrt[b]{e^{(x-a)}}} \longrightarrow \frac{1}{\left(\frac{1}{y} - 1\right)} = \left[e^{(x-a)}\right]^{\frac{1}{b}} \longrightarrow \log_{e^{(x-a)}} \frac{1}{\left(\frac{1}{y} - 1\right)} = \frac{1}{b}$$

$$\frac{1}{\log_{e^{(x-a)}} \frac{1}{\left(\frac{1}{y} - 1\right)}} = b \longrightarrow \frac{1}{\log_{e^{(x-a)}} \left(\frac{1}{y} - 1\right)^{-1}} = b$$

Logistische Funktion $N_{(\mu, \sigma)}$ angepaßt

$$y = \left(1 + e^{\frac{x-54}{3.9}} \right)^{-1} \longrightarrow y = \frac{1}{1 + e^{\frac{x-54}{3.9}}} y \longrightarrow \frac{1}{1 + \frac{1}{\sqrt[3.9]{e^{(x-54)}}}}$$

$$F(x) = \frac{1}{1 + \frac{1}{\sqrt[3.9]{e^{(x-54)}}}}, \quad F(y) = \log_e \left(\frac{1}{\frac{1}{\lambda} - 1} \right)^{3.9} + 54$$

Laplace Funktionen

$$F(x < a) = \frac{1}{2} \cdot e^{-\frac{(a-x)}{b}}$$

$$F(x \geq a) = 1 - \left(\frac{1}{2} \cdot e^{-\frac{(x-a)}{b}} \right)$$

Laplace Funktionen aufgelöst nach x

$$y = \frac{1}{2} \cdot e^{-\frac{(a-x)}{b}} \longrightarrow 2 \cdot y = e^{-\frac{(a-x)}{b}} \longrightarrow 2 \cdot y = \frac{1}{\sqrt[b]{e^{(a-x)}}} \longrightarrow \frac{1}{2 \cdot y} = \sqrt[b]{e^{(a-x)}}$$

$$\left(\frac{1}{2 \cdot y} \right)^b = e^{(a-x)} \longrightarrow \log_e \left(\frac{1}{2 \cdot y} \right)^b = a - x$$

$$\log_e \left(\frac{1}{2 \cdot y} \right)^b - a = -x \longrightarrow a - \log_e \left(\frac{1}{2 \cdot y} \right)^b = x$$

$$a - \log_e (2 \cdot y)^{-b} = x$$

$$F^{-1}(x < a) = F(y) = x = a - \log_e (2 \cdot y)^{-b}$$

$$y = 1 - \left(\frac{1}{2} \cdot e^{-\frac{(x-a)}{b}} \right) \longrightarrow 1 - y = \frac{1}{2} \cdot e^{-\frac{(x-a)}{b}} \longrightarrow 1 - y = \frac{1}{2} \cdot e^{-\frac{(x-a)}{b}}$$

$$\left(\frac{1}{2 \cdot (1-y)} \right)^b = e^{(x-a)} \longrightarrow \log_e \left(\frac{1}{2 \cdot (1-y)} \right)^b = x - a$$

$$\log_e \left(\frac{1}{2 \cdot (1-y)} \right)^b + a = x$$

$$\log_e (2 - 2 \cdot y)^{-b} + a = x$$

$$F^{-1}(x \geq a) = F(y) = x = a + \log_e (2 - 2 \cdot y)^{-b}$$

Laplace Funktionen aufgelöst nach a

$$x = a - \log_e (2 \cdot y)^{-b} \longrightarrow x + \log_e (2 \cdot y)^{-b} = a$$

$$x = a + \log_e (2 - 2 \cdot y)^{-b} \longrightarrow x - \log_e (2 - 2 \cdot y)^{-b} = a$$

Laplace Funktionen aufgelöst nach b

$$x = a - \log_e (2 \cdot y)^{-b} \longrightarrow a - x = \log_e (2 \cdot y)^{-b} \longrightarrow e^{a-x} = (2 \cdot y)^{-b}$$

$$\log_{2 \cdot y} e^{a-x} = -b \longrightarrow -\log_{2 \cdot y} e^{a-x} = b$$

$$x = a + \log_e (2 - 2 \cdot y)^{-b} \longrightarrow x - a = \log_e (2 - 2 \cdot y)^{-b} \longrightarrow e^{x-a} = (2 - 2 \cdot y)^{-b}$$

$$\log_{2-2 \cdot y} e^{x-a} = -b \longrightarrow -\log_{2-2 \cdot y} e^{x-a} = b$$

Pareto Funktion

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

Pareto Funktion aufgelöst nach x

$$y = 1 - x^{-c} \longrightarrow 1 - y = x^{-c} \longrightarrow 1 - y = \frac{1}{x^c}$$

$$\frac{1}{1-y} = x^c \longrightarrow \sqrt[c]{\frac{1}{1-y}} = x \longrightarrow \sqrt[c]{(1-y)^{-1}} = x$$

$$x = (1-y)^{-\frac{1}{c}}$$

$$F^{-1}(x) = F(y) = x = (1-y)^{-\frac{1}{c}}$$

Pareto Funktion aufgelöst nach c

$$y = 1 - x^{-c} \longrightarrow 1 - y = x^{-c} \longrightarrow (1-y)^{-1} = x^c$$

$$\log_x (1-y)^{-1} = c$$

Exponential Funktion

$$F(x) = 1 - e^{(-\lambda \cdot x)}$$

Exponential Funktion aufgelöst nach x

$$y = 1 - e^{(-\lambda \cdot x)} \longrightarrow 1 - y = e^{(-\lambda \cdot x)} \longrightarrow \frac{1}{1-y} = e^{\lambda \cdot x}$$

$$\log_e \left(\frac{1}{1-y} \right) = \lambda \cdot x \longrightarrow \frac{\log_e \left(\frac{1}{1-y} \right)}{\lambda} = x \longrightarrow \frac{1}{\lambda} \cdot \log_e (1-y)^{-1} = x$$

$$F^{-1}(x) = F(y) = x = \frac{1}{\lambda} \cdot \log_e (1-y)^{-1}$$

Exponential Funktion aufgelöst nach λ

$$y = 1 - e^{(-\lambda \cdot x)} \longrightarrow 1 - y = e^{(-\lambda \cdot x)} \longrightarrow (1-y)^{-1} = e^{\lambda \cdot x}$$

$$\frac{\log_e (1-y)^{-1}}{x} = \lambda$$

Extremwert Funktion

$$F(x) = e^{-\left(e^{\frac{(x-a)}{b}}\right)}$$

$$F(x) = e^{-\left(e^{\frac{(x-a)}{b}}\right)} \longrightarrow F(x) = e^{-\left(\frac{1}{\sqrt[b]{e^{x-a}}}\right)} \longrightarrow F(x) = \frac{1}{\sqrt[b]{e^{x-a}} \sqrt{e}}$$

Extremwert Funktion aufgelöst nach x

$$y = e^{-\left(e^{\frac{(x-a)}{b}}\right)} \longrightarrow \frac{1}{y} = e^{\left(e^{\frac{(x-a)}{b}}\right)} \longrightarrow \log_e \frac{1}{y} = e^{\frac{(x-a)}{b}}$$

$$\log_e \frac{1}{y} = \frac{1}{\sqrt[b]{e^{(x-a)}}} \longrightarrow \frac{1}{\log_e \frac{1}{y}} = \sqrt[b]{e^{(x-a)}}$$

$$\left(\frac{1}{\log_e \frac{1}{y}}\right)^b = e^{(x-a)} \longrightarrow \log_e \left(\frac{1}{\log_e \frac{1}{y}}\right)^b = x - a$$

$$\log_e \left(\frac{1}{\log_e \frac{1}{y}}\right)^b + a = x \longrightarrow \log_e \left[(\log_e y^{-1})^{-1}\right]^b + a = x$$

$$\log_e (\log_e y^{-1})^{-b} + a = x$$

$$F^{-1}(x) = F(y) = x = \log_e (\log_e y^{-1})^{-b} + a$$

Extremwert Funktion aufgelöst nach a

$$x = \log_e (\log_e y^{-1})^{-b} + a \longrightarrow x - \log_e (\log_e y^{-1})^{-b} = a$$

Extremwert Funktion aufgelöst nach b

$$\log_e \frac{1}{y} = \frac{1}{\sqrt[b]{e^{(x-a)}}} \longrightarrow \frac{1}{\log_e \frac{1}{y}} = \sqrt[b]{e^{(x-a)}} \longrightarrow \log_{e^{(x-a)}} \left(\frac{1}{\log_e \frac{1}{y}}\right) = \frac{1}{b}$$

$$\left[\log_{e^{(x-a)}} \left(\frac{1}{\log_e y^{-1}}\right)\right]^{-1} = b$$

Cauchy Funktion

$$F(x) = \frac{1}{2} + \frac{1}{\pi} \cdot \tan^{-1} \left(\frac{x - \eta}{\theta} \right)$$

Cauchy Funktion aufgelöst nach x

$$y = \frac{1}{2} + \frac{1}{\pi} \cdot \tan^{-1} \left(\frac{x - \eta}{\theta} \right)$$

$$y - \frac{1}{2} = \frac{1}{\pi} \cdot \tan^{-1} \left(\frac{x - \eta}{\theta} \right) \longrightarrow \left(y - \frac{1}{2} \right) \cdot \pi = \tan^{-1} \left(\frac{x - \eta}{\theta} \right)$$

$$\tan \left(\left(y - \frac{1}{2} \right) \cdot \pi \right) = \frac{x - \eta}{\theta} \longrightarrow \left[\tan \left(\left(y - \frac{1}{2} \right) \cdot \pi \right) \right] \cdot \theta = x - \eta$$

$$\left[\tan \left(\left(y - \frac{1}{2} \right) \cdot \pi \right) \right] \cdot \theta + \eta = x \longrightarrow \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] + \eta = x$$

$$F^{-1}(x) = F(y) = x = \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] + \eta$$

Cauchy Funktion aufgelöst nach η

$$x = \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] + \eta \longrightarrow x - \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] = \eta$$

Cauchy Funktion aufgelöst nach θ

$$x = \theta \cdot \tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right] + \eta \longrightarrow \frac{x - \eta}{\tan \left[\left(y - \frac{1}{2} \right) \cdot \pi \right]} = \theta$$

Rayleigh Funktion

$$F(x) = 1 - e^{-\left(\frac{x^2}{2 \cdot b^2}\right)}$$

Rayleigh Funktion aufgelöst nach x

$$y = 1 - e^{-\left(\frac{x^2}{2 \cdot b^2}\right)} \longrightarrow 1 - y = e^{-\left(\frac{x^2}{2 \cdot b^2}\right)}$$

$$\log_e(1 - y) = -\frac{x^2}{2 \cdot b^2} \longrightarrow \log_e(1 - y) \cdot 2 \cdot b^2 = -x^2$$

$$-\log_e(1 - y) \cdot 2 \cdot b^2 = x^2 \longrightarrow \sqrt{-\log_e(1 - y) \cdot 2 \cdot b^2} = x$$

$$F^{-1}(x) = F(y) = x = \sqrt{-\log_e(1 - y) \cdot 2 \cdot b^2}$$

Rayleigh Funktion aufgelöst nach b

$$\log_e(1 - y) = -\frac{x^2}{2 \cdot b^2} \longrightarrow \frac{x^2}{\log_e(1 - y)} = -2 \cdot b^2 \longrightarrow \frac{x^2}{-2 \cdot \log_e(1 - y)} = b^2$$

$$\sqrt{\frac{x^2}{-2 \cdot \log_e(1 - y)}} = b$$

Weibull Funktion

$$F(x) = 1 - e^{-\left(\frac{x}{b}\right)^c}$$

$$F(x) = 1 - e^{-\left(\frac{x}{b}\right)^c} \longrightarrow F(x) = 1 - e^{-\frac{x^c}{b^c}} \longrightarrow F(x) = 1 - \frac{1}{\sqrt[c]{b^c e^{x^c}}}$$

Weibull Funktion aufgelöst nach x

$$y = 1 - e^{-\left(\frac{x}{b}\right)^c} \longrightarrow 1 - y = e^{-\left(\frac{x}{b}\right)^c}$$

$$\log_e(1 - y) = -\left(\frac{x}{b}\right)^c \longrightarrow \sqrt[c]{\log_e(1 - y)} = -\frac{x}{b}$$

$$\sqrt[c]{\log_e(1 - y)} \cdot b = -x \longrightarrow \sqrt[c]{\log_e(1 - y)} \cdot -b = x$$

$$F^{-1}(x) = F(y) = x = \sqrt[c]{\log_e(1 - y)} \cdot -b$$

Weibull Funktion aufgelöst nach b

$$x = \sqrt[c]{\log_e(1 - y)} \cdot -b \longrightarrow -\frac{x}{\sqrt[c]{\log_e(1 - y)}} = b$$

Weibull Funktion aufgelöst nach c

$$\log_e(1 - y) = -\left(\frac{x}{b}\right)^c \longrightarrow \log_{\frac{x}{b}}|\log_e(1 - y)| = c$$

$$x = \sqrt[c]{\log_e(1 - y)} \cdot -b \longrightarrow -\frac{x}{b} = \sqrt[c]{\log_e(1 - y)} \longrightarrow \log_{|\log_e(1 - y)|} -\frac{x}{b} = \frac{1}{c}$$

$$\left(\log_{|\log_e(1 - y)|} \frac{x}{b}\right)^{-1} = c$$

Weibull Funktion $N_{(10.62; 4.10)}$ angepaßt

$$F(x) = 1 - e^{-\left(\frac{x}{12}\right)^3} \longrightarrow 1 - y = e^{-\left(\frac{x}{12}\right)^3} \longrightarrow \log_e(1 - y) = -\left(\frac{x}{12}\right)^3$$

$$\sqrt[3]{\log_e(1 - y)} = -\frac{x}{12} \longrightarrow \sqrt[3]{\log_e(1 - y)} \cdot 12 = -x \longrightarrow \log_e(1 - y) \cdot 1728 = -x^3$$

$$\log_e(1 - y) = -\frac{x^3}{1728} \longrightarrow 1 - y = e^{-\frac{x^3}{1728}} \longrightarrow 1 - y = \frac{1}{\sqrt[1728]{e^{x^3}}}$$

$$y = 1 - \frac{1}{\sqrt[1728]{e^{x^3}}} \longrightarrow y = 1 - e^{-\left(\frac{x}{12}\right)^3} \longrightarrow y = 1 - \frac{1}{\sqrt[12^3]{e^{x^3}}}$$

$$F(x) = 1 - \frac{1}{\sqrt[1728]{e^{x^3}}}, F(y) = -12 \cdot \sqrt[3]{\log_e(1 - y)}$$

$$F(x = z) = 1 - e^{-\left(\frac{4.1 \cdot x + 10.62}{12}\right)^3} = 1 - \frac{1}{\sqrt[12^3]{e^{(4.1x + 10.62)^3}}} = 1 - \frac{1}{\sqrt[1728]{e^{(4.1x + 10.62)^3}}}$$