Inverse of CDF for
Full-Tail-Gamma (FTG) Distribution

CDF

$$F(x) = 1 - \underbrace{\Gamma(\alpha, \overbrace{\rho + \theta \cdot x}^{z})}_{g(z)} = u$$

$$\Leftrightarrow \quad \underbrace{1 - u}_{b} = \Gamma(\alpha, \rho + \theta x) = \underbrace{\Gamma(\alpha, z)}_{g(z)}$$

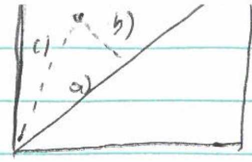
$$b = g(z) = \Gamma(\alpha, z)$$

$$\Leftrightarrow \quad z = g^{-1}(b)$$

$$\Leftrightarrow \quad z = \Gamma^{-1}(\alpha, b) \qquad | \text{ Re-substitution}$$

$$\rho + \theta \cdot x = \Gamma^{-1}(\alpha, 1-u)$$

$$x = \frac{\Gamma^{-1}(\alpha, 1-u) - \rho}{\theta} = F^{-1}(u)$$



Euclidean Norm
Pythagoras rule $a^2+b^2=c^2$ in triangle

b) $(x-x')^2 + (y-y')^2 \quad = H = (x-y')^2 + (y-y')^2$

a) $x'^2 + y'^2 = 2y'^2$

c) $x^2 + y^2$

a) $= x^2+y^2 - \left[(x-y')^2 + (y-y')^2\right]$

$\Leftrightarrow x^2 + y^2 - \left[x^2 - 2xy' + y'^2 + y^2 - 2yy' + y'^2\right]$

$\Leftrightarrow \cancel{x^2} + \cancel{y^2} - \cancel{x^2} + 2xy' - y'^2 - \cancel{y^2} + 2yy' - y'^2$

a) $= 2y'^2 \quad = \quad 2xy' - 2y'^2 + 2yy'$

$4y'^2 = 2xy' + 2yy' \quad | : y'$

$\dfrac{4y'\cdot\cancel{y'}}{\cancel{y'}} = 2x + 2y = 4y' \quad | : 4$

$\dfrac{2x + 2y}{4} = \dfrac{x+y}{2} = y'$

b) $= H^2 = x^2 + y^2 - 2y'^2$

$= x^2 + y^2 - 2\cdot\left(\dfrac{x+y}{2}\right)^2$

$\Leftrightarrow x^2 + y^2 - 2\cdot\dfrac{(x^2+2xy+y^2)}{4}$

$\Leftrightarrow x^2 + y^2 - \dfrac{(x+y)^2}{2} = H^2 \quad | \cdot 2$

$2(x^2+y^2) - (x+y)^2 = 2H^2$

$\Leftrightarrow 2x^2 + 2y^2 - x^2 - 2xy - y^2 = 2H^2$

$\Leftrightarrow \underbrace{x^2 + y^2 - 2xy = (x-y)^2}_{\text{2. binomische Formel}} = 2H^2 \quad | : 2$

$\Leftrightarrow \dfrac{(x-y)^2}{2} = H^2 \quad | \sqrt{\ } \quad \Big| \quad \dfrac{|x-y|}{\sqrt{2}} = H$