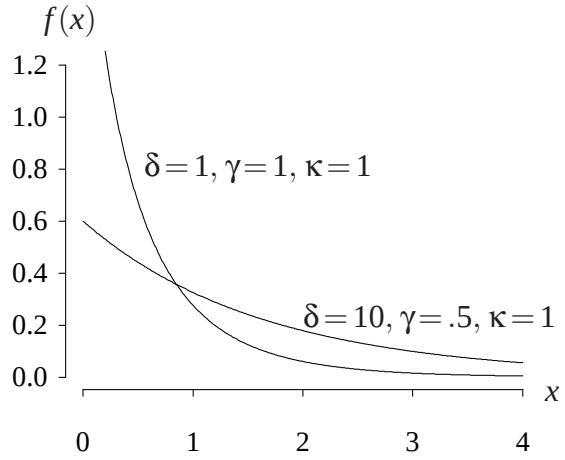
**Generalized Pareto distribution** (from http://www.math.wm.edu/~leemis/chart/UDR/UDR.html) The shorthand $X \sim$ generalized Pareto$(\delta, \kappa, \gamma)$ is used to indicate that the random variable $X$ has the generalized Pareto distribution with shape parameters $\delta, \kappa$ and $\gamma$. A generalized Pareto random variable $X$ has probability density function

$$f(x) = \left(\gamma + \frac{\kappa}{x+\delta}\right)(1+x/\delta)^{-\kappa} e^{-\gamma x} \qquad \delta > 0; \;\; \gamma \geq 0; \;\; \kappa \geq -\delta\gamma$$

for $x > 0$. The probability density function with two different parameter combinations is illustrated below.




The cumulative distribution function on the support of $X$ is

$$F(x) = P(X \leq x) = 1 - e^{-\gamma x}(1+x/\delta)^{-\kappa} \qquad x > 0.$$

The survivor function on the support of $X$ is

$$S(x) = P(X \geq x) = e^{-\gamma x}(1+x/\delta)^{-\kappa} \qquad x > 0.$$

The hazard function on the support of $X$ is

$$h(x) = \frac{f(x)}{S(x)} = \gamma + \frac{\kappa}{x+\delta} \qquad x > 0.$$

The cumulative hazard function on the support of $X$ is

$$H(x) = -\ln S(x) = \gamma x + \kappa \ln(1+x/\delta) \qquad x > 0.$$

The moment generating function and characteristic function of $X$, as well as the population mean, variance, skewness and kurtosis of $X$, are mathematically intractable.