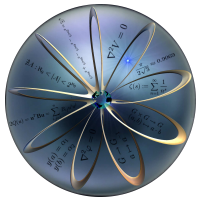

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Gumbel random variable

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X is a *Gumbel random variable* if it has a probability density function, given by

$$f_X(x) = \frac{1}{\sigma} \exp(\frac{x-\mu}{\sigma}) S(x)$$

where $-\infty < x < \infty$, μ is the *location parameter*, σ is the *scale parameter*, and $S(x)$ is the survivor function, $S(x) = \exp[-\exp(\frac{x-\mu}{\sigma})]$.

Notation for X having a Gumbel distribution is $X \sim \text{Gum}(\mu, \sigma)$.

: Given a Gumbel distribution $X \sim \text{Gum}(\mu, \sigma)$:

1. E[X]=$\mu - \gamma\sigma$, where γ is the Euler's constant
2. Var[X]=$\frac{\pi^2}{6}\sigma^2$

Remark. Nevertheless the interval $(-\infty, \infty)$ in which is defined, the Gumbel distribution is often used to model reliability or lifetime of products.