POSSIBLY USEFUL FACTS

Three distributions are defined by the following table for parameters $A > 0$ and $B > 0$. The mean of each distribution, as a function of A and B, is also given.

notation	density function	mean
Beta(A, B)	$\frac{\Gamma(A+B)}{\Gamma(A)\Gamma(B)}\, x^{A-1}\,(1-x)^{B-1}, \quad 0 < x < 1$	$A/(A+B)$
Gamma(A, B)	$\frac{B^A}{\Gamma(A)}\, x^{A-1}\, e^{-Bx}, \quad x > 0$	A/B
Inverse-Gamma(A, B)	$\frac{B^A}{\Gamma(A)}\, x^{-A-1}\, e^{-B/x}, \quad x > 0$	$B/(A-1)$ provided $A > 1$

The *mode* of a density function $p(x)$ is the value of x for which $p(x)$ achieves its highest value.

Suppose that the univariate density function $p(x)$ satisfies

$$-2\log\{p(x)\} = A\,x^2 + B\,x + \text{const}$$

for some $A > 0$ and $B \in \mathbb{R}$ and 'const' represents terms that do not depend on x. Then

$$p(x) \text{ is the } N\left(\frac{-B}{2A}, \frac{1}{A}\right) \text{ density function.}$$