Concavity property for pearson and Burr types distributions*

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Many interesting proposition and properties, in many branches of science such as economics have been obtained via the the assumption that the *log* of the cumulative distribution function of a random variable is a concave function. The log-concavity concern to twice differentiable real-valued function g whose domain is an interval on extended real line. A function g is said to be log-concave on the interval (a, b) if the function Lng is a concave function on (a, b). Log-concavity of g on (a, b) is equivalent to $g^{'}(x)/g(x)$ is monotone decreasing on (a, b) and $(\ln g(x))^{''} < 0$. Suppose that g is strictly monotonic defined on the interval (a, b) and either $g(a) = 0$ or $g(b) = 0$, then if $g^{'}$ is log-concave function on (a.b), it must be that $g(x)$ is a log-concave function on (a,b). On noting that if the density function f is log-concave on (l, h), then the cumulative distribution function is also log-concave on (l, h). Bagnoli and Bergstrom (2005) have obtained the log-concavity for distributions such as Normal, Logistic, Extreme-value, Exponential, Laplace, Weibull, Power Function, Uniform, Gamma, Beta, Pareto, Log Normal, Student's t, Cauchy and F distributions.We discussed and introduced the continuous versions of the Pearson and Burr families, also found the log-concavity for these families in general case and then obtained the log-concavity property for each distribution that is a member of Pearson or Burr family. If the density function f is log-concave on (a, b), then the failure rate is monotone decreasing on (a, b) and survival function is log-concave on (a, b). So we obtained this result for each member of Burr and Pearson family.

Keywords: Log-concavity, Continuous distributions, Pearson family, Burr family.

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