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Half-Cauchy and Power Cauchy Distributions: Ordinary Differential Equations

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Abstract

In this chapter, homogenous ordinary differential equations (ODES) of different orders were obtained for the probability density function, quantile function, survival function inverse survival function, hazard function and reversed hazard functions of half-Cauchy and power Cauchy distributions. This is possible since the aforementioned probability functions are differentiable. Differentiation and modified product rule were used to obtain the required ordinary differential equations, whose solutions are the respective probability functions. The different conditions necessary for the existence of the ODEs were obtained and it is almost in consistent with the support that defined the various probability functions considered. The parameters that defined each distribution greatly affect the nature of the ODEs obtained. This method provides new ways of classifying and approximating other probability distributions apart from half-Cauchy and power Cauchy distributions considered in this chapter. In addition, the result of the quantile function can be compared with quantile approximation using the quantile mechanics.

Keywords

Differential calculus Half-Cauchy distribution Hazard function Inverse survival function Power Cauchy distribution Quantile function Quantile mechanics Reversed hazard function Survival function

Notes

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