

**COMPARING ASYMPTOTIC EXPANSIONS FROM EDGEWORTH,
LUGANNANI-RICE, DANIELS AND CORDEIRO-FERRARI
WITH APPLICATIONS IN STATISTICS**

Rejane dos Santos BRITO¹
Gauss Moutinho CORDEIRO¹

- **ABSTRACT:** *In this paper we explain the saddlepoint approximation and present examples to show the applicability of these asymptotic expansions in statistics. Using the Laplace approximation for integrals and Edgeworth expansions we show how to derive the saddlepoint approximation to the density of a single random variable and then to the density of the sample mean of independent and identically distributed random variables. Cordeiro and Ferrari (1998) proposed a statistic which approximates to order $O(n^{-1})$ the standardized sum of independent and identically distributed random variables, where n is the samplesize. We show the performance of this statistic when compared to the expansions due to Edgeworth, Lugannani and Rice (1980) and Daniels (1987).*
- **KEYWORDS:** *Edgeworth approximation; Laplace approximation; Saddlepoint approximation; generalized Bartlett correction.*

¹ Departamento de Estatística e Informática -- DEINFO, Universidade Federal Rural de Pernambuco -- UFRPE, CEP: 50171-900, Recife, Pernambuco, Brasil. E-mail: janesbrito@gmail.com / gausscordeiro@uol.com.br