A CLASS OF CONSISTENT TESTS FOR EXPONENTIALITY BASED ON THE EMPIRICAL LAPLACE TRANSFORM

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Abstract. The Laplace transform $\psi(t) = E[\exp(-tX)]$ of a random variable with exponential density $\lambda \exp(-\lambda x)$, $x \geq 0$, satisfies the differential equation $(\lambda + t)\psi'(t) + \psi(t) = 0$, $t \geq 0$. We study the behaviour of a class of consistent ("omnibus") tests for exponentiality based on a suitably weighted integral of $[(\hat{\lambda}_n + t)\psi_n'(t) + \psi_n(t)]^2$, where $\hat{\lambda}_n$ is the maximum-likelihood-estimate of λ and ψ_n is the empirical Laplace transform, each based on an i.i.d. sample $X_1, \ldots, X_n$.

Key words and phrases: Exponential distribution, goodness-of-fit test, empirical Laplace transform, consistency.