

## ON DATA DRIVEN NEYMAN'S TESTS

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*Abstract:* The smooth tests for testing uniformity were introduced by Neyman [15]. The data driven method of selecting the number of components in a smooth test for uniformity is discussed, including the first-order asymptotic null distribution, consistency, empirical critical values and Monte Carlo powers. The first-order asymptotic null distribution is not sufficiently precise for approximation tools. A substantial improvement is made in this paper by deriving a second-order approximation of the null distribution, which turns out to be very accurate in numerical examples. The approximations are based on the second-order behaviour of Schwarz's selection rule  $S$  under uniformity. The new results on  $S$  are of independent interest.

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