

ZMATH 2015d.00872

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***p*-value approximations for *t*-tests of hypothesis.**

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Summary: Mathematics can be analyzed in different ways and each method supports the other with the same results. This paper describes a number of approaches for finding the *p*-values necessary for making decisions about statistical *t*-tests of hypothesis. The concepts of areas under the Student's *t*-curve and the mathematical connections between tests of hypothesis, probabilities and areas under a curve are presented. The Excel function TDIST and various approximation techniques from numerical analysis are discussed. Numerical analysis techniques include Simpson's Rule for integration and Monte Carlo integration. Also an approximation from the National Bureau of Standards is provided. Comparisons of results from each method are presented. Numerical approximations are shown to be as important and as accurate as exact solutions.

Classification: K75 K95 U75

Keywords: stochastics; university teaching; quantitative research; spreadsheets; simulation; mathematical statistics; statistical inference; hypothesis testing; parametric *t*-tests; *p*-values; decision analysis; numerical integration; gamma function; Monte Carlo integration; computer as educational medium; approximations; multiple approaches; *t*-distribution; Simpson's rule; NBS approximation; one-sample *t*-test; two-independent-samples *t*-test; paired-samples *t*-test

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