



Does the Moment-Generating Function Characterize a Distribution?

Peter McCullagh

The American Statistician, Volume 48, Issue 3 (Aug., 1994), 208.

Stable URL:

<http://links.jstor.org/sici?sici=0003-1305%28199408%2948%3A3%3C208%3ADTMFCA%3E2.0.CO%3B2-R>

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

The American Statistician is published by American Statistical Association. Please contact the publisher for further permissions regarding the use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/astata.html>.

The American Statistician

©1994 American Statistical Association

JSTOR and the JSTOR logo are trademarks of JSTOR, and are Registered in the U.S. Patent and Trademark Office. For more information on JSTOR contact jstor-info@umich.edu.

©2003 JSTOR

Does the Moment-Generating Function Characterize a Distribution?

Peter McCULLAGH

It is shown that two visibly distinct distributions can have almost identical moment-generating functions.

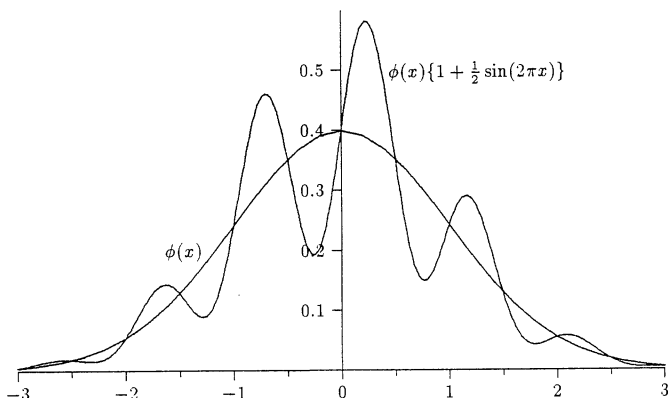


Figure 1. Two Density Functions: Total Variance Distance Is 0.16.

All probabilists agree that two different distributions cannot have the same moment-generating function. Although the distributions in this example are visibly quite

Peter McCullagh is Professor, Department of Statistics, University of Chicago, Chicago, IL 60637.

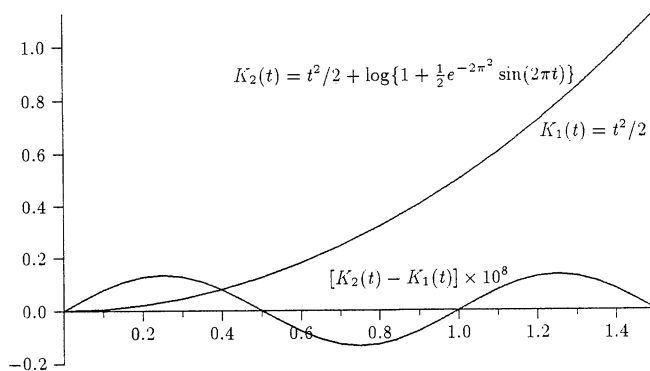


Figure 2. Two Cumulant-Generating Functions and Their Differences (Enlarged by a Factor of 10^8).

different (Fig. 1), the two cumulant-generating functions appear coincident. Even if Figure 2 were plotted by a high-resolution laser printer on top-quality mile-square photographic paper, the difference would be less than one pixel over the entire range. The maximum difference of 1.34×10^{-9} is less than the error often tolerated for purposes of numerical approximation. So the answer to the question posed in the title must be *yes* for mathematical purposes but a resounding *no* for numerical purposes.

[Received December 1993.]