

# Wishartness of Quadratic Forms: A Characterization Via Jordan Algebra Representations\*

Joe Masaro<sup>†</sup>

*Acadia University, Wolfville, Nova Scotia, Canada B4P 2R6*

and

Chi Song Wong<sup>‡</sup>

*University of Windsor, Windsor, Ontario, Canada N9B 3P4*

Received June 16, 2008, Accepted December 16, 2008.

## Abstract

For a normal random variable  $Y$  with mean zero and general covariance matrix  $\Sigma_Y$  the Wishartness of a quadratic form  $Q(Y)$  is characterized in terms of Jordan algebra representations. The framework of Jordan algebras provides a unified view since the cases where  $Y$  is a real, complex or quaternionic normal are encompassed under one general theory. A general version of Cochran's theorem is also presented.

**Keywords and Phrases:** *Cochran's Theorem, Jordan algebras, Multivariate normal distribution, Quadratic forms, Wishart distribution.*

---

\*AMS 1991 *Mathematics Subject Classification.* Primary 62H05; secondary 62H10.

<sup>†</sup>E-mail: joe.masaro@acadiau.ca

<sup>‡</sup>E-mail: cswong@uwindsor.ca