



CORRELATION MATRICES WITH THE PERRON-FROBENIUS PROPERTY*

PHELIM BOYLE[†] AND THIerno B. N'DIAYE[‡]

Abstract. This paper investigates conditions under which correlation matrices have a strictly positive dominant eigenvector. The sufficient conditions, from the Perron-Frobenius theorem, are that all the matrix entries are positive. The conditions for a correlation matrix with some negative entries to have a strictly positive dominant eigenvector are examined. The special structure of correlation matrices permits obtaining of detailed analytical results for low dimensional matrices. Some specific results for the n -by- n case are also derived. This problem was motivated by an application in portfolio theory.

Key words. Perron-Frobenius theory, Correlation matrix, Permutation matrix.

AMS subject classifications. 15A18, 15B48.

*Received by the editors on September 5, 2017. Accepted for publication on April 5, 2018. Handling Editor: Michael Tsatsomeros. Corresponding Author: Phelim Boyle. Research was funded by the Natural Sciences and Engineering Research Council of Canada.

[†]Wilfrid Laurier University, Waterloo, Ontario, N2L 3C5, Canada (pboyle@wlu.ca).

[‡]African Institute for Mathematical Sciences, Mbour-Thies, Senegal (thierno.b.ndiaye@aims-senegal.org).