Financial Mathematics

Rotations, reflections and orthogonal transformations

0031-1.

Find a 4×4 rotation matrix whose first column has entries

$$-\sqrt{1/7},\ \sqrt{2/7},\ \sqrt{1/7},\ \sqrt{3/7}.$$

0031-2.

Find a 2×2 rotation matrix M

s.t. $L_M(\sqrt{3}/2, -1/2) = (\sqrt{2}/2, -\sqrt{2}/2)$.

0031-3.

a. Compute

$$R := \begin{bmatrix} 1 & 0 & 0 \\ 0 & \sqrt{3}/2 & -1/2 \\ 0 & 1/2 & \sqrt{3}/2 \end{bmatrix} \begin{bmatrix} 4/5 & -3/5 & 0 \\ 3/5 & 4/5 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

b. Show that the rows of R are orthonormal.

c. Compute R^{-1}.