Financial Mathematics

Eigenvalues and eigenvectors

Let $M := \begin{bmatrix} -1 & 2 \\ 3 & -2 \end{bmatrix}$.

0032-1. a. Find the eigenvalues of M.

b. For each eigenvalue,
find an eigenvector with that eigenvalue.

c. Find a 2×2 invertible
matrix C s.t. $C^{-1}MC$ is diagonal.

d. Find e^M.

Let $M := \begin{bmatrix} 45 & -25 & -24 \\ 0 & -4 & 0 \\ 80 & -41 & -43 \end{bmatrix}$.

0032-2. a. Find the eigenvalues of M.

b. For each eigenvalue λ of M, find a basis for $\ker(M - \lambda I)$, the λ-eigenspace of M.

c. Find a matrix C such that CMC^{-1} is diagonal.

d. Find e^{tM}.

(Each entry of e^{tM} is an expression of t.)