

Eigenvalue and Diagonalization Homework

On this assignment, perform all computations manually. Do not use matlab or a calculator, except to process square roots and the like.

A 2x2 moment of inertia tensor is $I = \begin{bmatrix} 8 & 3 \\ 3 & 5 \end{bmatrix}$.

Find the eigenvalues of this matrix.

Find the normalized eigenvectors of this matrix.

Demonstrate how the matrix can be diagonalized using the eigenvector matrix.

If $\begin{bmatrix} \hat{e}'_1 \\ \hat{e}'_2 \end{bmatrix} = [S] \begin{bmatrix} \hat{e}_1 \\ \hat{e}_2 \end{bmatrix}$, where $[S]$ is the eigenvector matrix, what is the angle of rotation?

Hint: $[S] = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$.