1, **Find the eigenvalues of the matrix and for each eigenvalue,**
    a corresponding eigenvector.
    Check that eigenvectors associated with distinct eigenvalues are orthogonal.
    Find an otrhogonal matrix that diagonalizes the matrix. (P362, Problem 11)

$$\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & -2 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

2, **Find the standard form of the quadratic form.**
    $-2\,x_1\,x_2 + 2\,x_3^2$

3, **Use the principal axis theorem to analyze the conic**
    $3\,x_1^2 + 5\,x_1\,x_2 - 3\,x_2^2 = 5$

4, **Revisit Example Problem 8.17 and calculate the angle**
    of the y1 axis relative to the x1 axis, as shown in Figure 8.2