HW 7

Problem 1 We say a square matrix P is orthogonal if $P^tP = I$.
Solve #5 (a)(b)(c) in sec4.6

Problem 2 Read the example (4.6.5) in the textbook and solve the following question:

Let $A = \begin{bmatrix} 5 & 3 \\ 3 & 5 \end{bmatrix}$.

(a) Show that A is symmetric.
(b) Find a orthonormal basis of $\mathbf{R}^2$ consisting of eigenvectors.
(c) Find a diagonal matrix that is orthogonally similar to the matrix A.
(d) Compute the determinant of A^5.
(e) Sketch the conic section $5x_1^2 + 6x_1x_2 + 5x_2^2 = 32$ in the x_1x_2 plane.

Note: We say that matrices A and B are orthogonally similar if there exists an orthogonal matrix P such that $A = P^tBP$.