
Exercise 1 If $A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 3 & 7 \\ 0 & 7 & 3 \end{bmatrix}$, find an orthogonal matrix Q such that $Q^{-1}AQ$ is diagonal.

$$Q = \begin{bmatrix} 1 & 0 & 0 \\ \dots & 1/\sqrt{2} & 1/\sqrt{2} \\ \dots & 1/\sqrt{2} & \dots \end{bmatrix}$$