

Problems to prepare for PCA

Note λ is a constant in all these problems.

1. Find the eigenvalues and eigenvectors of these matrices:

$$A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} -3 & 2 \\ 2 & -3 \end{bmatrix}$$

2. Find the norms of the following vectors
(the norm is the square root of the dot product):

$$\|\vec{x}\| = \sqrt{\vec{x}^T \vec{x}}$$

$$\vec{x} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$\vec{y} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$\vec{z} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$$