

Introduction to EigenVectors

Linear Algebra

College of the Atlantic

Consider the matrix

$$A = \begin{bmatrix} 7 & 6 \\ 6 & -2 \end{bmatrix} \quad (1)$$

1. Is $\vec{v}_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ an eigenvector of A ? If so, what is the corresponding eigenvalue?

2. Is $\vec{v}_2 = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ an eigenvector of A ? If so, what is the corresponding eigenvalue?

3. Is $\vec{v}_3 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ an eigenvector of A ? If so, what is the corresponding eigenvalue?

4. Now consider the matrix: Consider the matrix

$$B = \begin{bmatrix} 10 & 0 \\ 0 & -5 \end{bmatrix} \quad (2)$$

In words, what does B do to $\vec{e}_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$? What does B do to $\vec{e}_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$?

5. What does the matrix A do to \vec{v}_1 ? What does A do to \vec{v}_2 ?

6. Do \vec{v}_1 and \vec{v}_2 form a basis for \mathbb{R}^2 .

7. Which equation would you rather solve: $A\vec{x} = \vec{b}$ or $B\vec{x} = \vec{b}$?