

## 0.6 Eigenvectors and Eigenvalues

1. When we apply a matrix to one of its eigenvectors, what happens to the eigenvector geometrically?

2. Find the eigenvalue when the matrix  $\begin{bmatrix} 1 & 9 \\ 4 & 1 \end{bmatrix}$  is applied to its eigenvector  $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$

3. Geometrically what happens to the vector when the eigenvalue is

(a) greater than 1

(b) less than 1

### Answers

1. The eigenvector stays in the same direction but its length gets shorter or longer or shorter

2.  $\begin{bmatrix} 1 & 9 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \end{bmatrix} = \begin{bmatrix} 21 \\ 14 \end{bmatrix} = 7 \begin{bmatrix} 3 \\ 2 \end{bmatrix}$ , Therefore the eigenvalue = 7

3.

(a) the vector stays in the same direction  
and its length increases

(b) the vector stays in the same direction  
and its length decreases