

# Eigenvalues and Eigenvectors

**Definition:** Let  $A$  be an  $n \times n$  matrix. A scalar  $\lambda$  (lambda) is called an **eigenvalue** of  $A$  if there is a nonzero vector  $\mathbf{x}$  such that  $A\mathbf{x} = \lambda\mathbf{x}$ . Such a vector  $\mathbf{x}$  is called an **eigenvector** of  $A$  corresponding to  $\lambda$ .

**Definition:** Let  $A$  be an  $n \times n$  matrix and let  $\lambda$  be an eigenvalue of  $A$ . The collection of all eigenvectors corresponding to  $\lambda$ , together with the zero vector, is called the **eigenspace** of  $\lambda$  and is denoted by  $E_\lambda$ .