

Name: _____ ID #: _____

As always you need to show your work. Fill in the appropriate blanks

1. A pair (λ, v) is an eigen pair if

and

In[6]:= Eigensystem $\left[\begin{pmatrix} 1 & -a \\ a & 1 \end{pmatrix}\right]$

Out[6]= $\{\{1 - \text{i} a, 1 + \text{i} a\}, \{-\text{i}, 1\}, \{\text{i}, 1\}\}$

2. For $A = \begin{pmatrix} 1 & 2 \\ -2 & 1 \end{pmatrix}$.

2.1. Compute the eigenvalues of A

2.2. compute the eigenvectors of A

3. The matrix $A = \begin{pmatrix} a & -b \\ b & a \end{pmatrix}$ is a scaling by

and a rotation by

4. A scaling by r and a rotation by angle ϕ has matrix $A = \begin{pmatrix} & \\ & \end{pmatrix} \begin{pmatrix} & \\ & \end{pmatrix}^i$

5. The matrix $A = \begin{pmatrix} 1 & -2 \\ 2 & 1 \end{pmatrix}$ is a scaling by

and a rotation by