Mathematics 1553
Quiz 7
Prof. Margalit

Section   E1/Arjun   E2/Qianli   E3/Kemi   E4/Martin   E5/Bharat   (circle one!)

10 November 2017

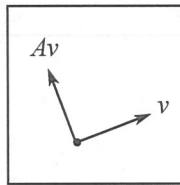1. Write the definition of *eigenvector* and *eigenvalue* for an $n \times n$ matrix A.

If $Av = \lambda v$ where $v \neq 0$

λ in $\mathbb{R}$

then v is an eigenvector for A

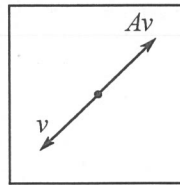and λ is the corresponding eigenvalue.

2. Under each picture, write the *eigenvalue* being depicted (an estimate is fine). If the picture does not show an eigenvector, write NO. (Only real numbers allowed.)
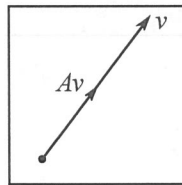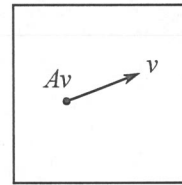
$\frac{1}{2}$ NO -1 0

Turn the page over!

3. Find the eigenvalues and corresponding eigenvectors.

$$\begin{pmatrix} 0 & 1 \\ -2 & -3 \end{pmatrix}$$

eigenvalues: $\det \begin{pmatrix} -\lambda & 1 \\ -2 & -3-\lambda \end{pmatrix} = \lambda^2 + 3\lambda + 2$

$\rightsquigarrow (\lambda+2)(\lambda+1)$

$\rightsquigarrow \lambda = -1, -2$

(-1) - eigenspace: $\begin{pmatrix} 1 & 1 \\ -2 & -2 \end{pmatrix} \rightsquigarrow \begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix} \rightsquigarrow \begin{pmatrix} -1 \\ 1 \end{pmatrix}$

(-2) - eigenspace: $\begin{pmatrix} 2 & 1 \\ -2 & -1 \end{pmatrix} \rightsquigarrow \begin{pmatrix} 2 & 1 \\ 0 & 0 \end{pmatrix} \rightsquigarrow \begin{pmatrix} -1 \\ 2 \end{pmatrix}$.