MTH 266, Quiz #12, Fall 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} -4 & -1 \\ 6 & 1 \end{bmatrix}$. Is the matrix diagonalizable? Why or why not?

$(-4-\lambda)(1-\lambda)+6=0$

$\lambda^2+3\lambda+2=0$

$(\lambda+2)(\lambda+1)=0$

$\lambda=-2,-1$

Yes, it is diagonalizable there are distinct eigenvalues

$\lambda=-2$ $\begin{bmatrix} -2 & -1 \\ 6 & 3 \end{bmatrix}$ $6x_1=-3x_2$ $x_1=-\frac{1}{2}x_2$ $\begin{bmatrix} -1 \\ 2 \end{bmatrix}$

$\lambda=-1$ $\begin{bmatrix} -3 & -1 \\ 6 & 2 \end{bmatrix}$ $6x_1=-2x_2$ $x_1=-\frac{1}{3}x_2$ $\begin{bmatrix} -1 \\ 3 \end{bmatrix}$

2. Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 5 & 3 \\ -4 & 4 \end{bmatrix}$. If the eigenpairs are real, what size space do they span?

$(5-\lambda)(4-\lambda)+12=0$

$\lambda^2-9\lambda+32=0$

$\lambda=\frac{9\pm\sqrt{81-128}}{2}=$

$\lambda=\frac{9}{2}\pm\frac{\sqrt{47}}{2}i$

The eigenvalues are not real