

Assignment 10

15 questions
x 2 = 10 marks)

1. Use matrix multiplication to find the image of vector $(3, -4)$ when it is rotated through an angle of:
- $\theta = 30^\circ$
 - $\theta = -60^\circ$
 - $\theta = 45^\circ$
 - $\theta = 90^\circ$

2. Find the eigenvalues + eigenvectors of $\begin{pmatrix} 0 & 0 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

3. Find the eigenvalues + eigenvectors of $\begin{pmatrix} 10 & -9 & 0 & 0 \\ 4 & -2 & 0 & 0 \\ 0 & 0 & -2 & -7 \\ 0 & 0 & 1 & 2 \end{pmatrix}$

4. Are the following matrices diagonalizable?

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

b) $\begin{pmatrix} -1 & 0 & 1 \\ -1 & 3 & 0 \\ -4 & 13 & -1 \end{pmatrix}$

5. Find matrix P that diagonalizes A + find $P^{-1}AP$.

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