

Math 54 Handout 9

July 5, 2018

Question 1.

Let $B = \left\{ \begin{pmatrix} 7 \\ 5 \end{pmatrix}, \begin{pmatrix} -3 \\ -1 \end{pmatrix} \right\}$ and $C = \left\{ \begin{pmatrix} 1 \\ -5 \end{pmatrix}, \begin{pmatrix} -2 \\ 2 \end{pmatrix} \right\}$. Find the change-of-coordinates matrix from C to B .

Question 2.

Let $B = \{-1 + 8x, 1 - 5x\}$ and $C = \{1 + 4x, 1 + x\}$. Find the change-of-coordinates matrix from C to B .

Question 3.

Is $\begin{pmatrix} 4 \\ -3 \\ 1 \end{pmatrix}$ an eigenvector of $\begin{pmatrix} 3 & 7 & 9 \\ -4 & -5 & 1 \\ 2 & 4 & 4 \end{pmatrix}$? If so, find the eigenvalue.

Question 4.

Find a basis for the eigenspace of $\begin{pmatrix} 4 & 2 & 3 \\ -1 & 1 & -3 \\ 2 & 4 & 9 \end{pmatrix}$ corresponding to the eigenvalue $\lambda = 3$.

Question 5.

Let T be the transformation on $\mathbb{R}^2$ that rotates the plane by a degree $\theta \in (0, 2\pi)$. Does T have a real eigenvalue with an corresponding eigenvector?

Let T be the transformation on $\mathbb{R}^2$ that flips the plane about the y-axis. Does T have a real eigenvalue with an corresponding eigenvector?

Question 6.

True or False:

1. Row reduction does not change the eigenvalues of a matrix A .
2. If v_1, v_2 are linearly independent eigenvectors, then they correspond to distinct eigenvalues.