WebAssign
CH 7.2 - 2 (Homework)

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MA 265 Spring 2013, section 132, Spring 2013
Instructor: Alexandre Eremenko

Current Score : 20 / 20 **Due :** Thursday, April 11 2013 11:40 PM EDT

The due date for this assignment is past. Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may *not* grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

Request Extension View Key

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1. 4/4 points | Previous Answers KolmanLinAlg9 7.2.012.

Let A be a 2×2 matrix whose eigenvalues are 3 and 4, and associated eigenvectors are $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$ and $\begin{bmatrix} 5 \\ 1 \end{bmatrix}$, respectively. Without computation, find a diagonal matrix D that is similar to A, and singular matrix P such that $P^{-1}AP = D$. (Enter each matrix in the form [[row 1], [row 2], ...], where each row is a comma-separated list.)

$(D, P) = \left(\boxed{\text{[[3,0],[0,4]],[[-1,5],[1,1]]}} \right)$

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2. 4/4 points | Previous Answers KolmanLinAlg9 7.2.013.

Let A be a 3×3 matrix whose eigenvalues are -2, 4, and 4, and associated eigenvectors are

$$\begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, \quad \text{and} \quad \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix},$$

respectively. Without computation, find a diagonal matrix D that is similar to A, and a nonsingular matrix P such that $P^{-1}AP = D$. (Enter each matrix in the form [[row 1], [row 2], ...], where each row is a comma-separated list.)

$(D, P) = \left(\boxed{\text{[[-2,0,0],[0,4,0],[0,0,4]],[[-1,0,0],[0,0,2],[1,1,1]]}} \right)$

3. 4/4 points | Previous Answers KolmanLinAlg9 7.2.015.

Show that each of the following matrices is diagonalizable by finding a diagonal matrix similar to each given matrix.

(a) $\begin{bmatrix} 2 & 4 \\ 3 & 3 \end{bmatrix}$

6	0
0	-1

(b) $\begin{bmatrix} 2 & 4 \\ 4 & 8 \end{bmatrix}$

0	0
0	10

(c) $\begin{bmatrix} 6 & -2 & 3 \\ 0 & 3 & -2 \\ 0 & -1 & 2 \end{bmatrix}$

6	0	0
0	4	0
0	0	1

(d) $\begin{bmatrix} 0 & -2 & 3 \\ 1 & 3 & -3 \\ 0 & 0 & 1 \end{bmatrix}$

2	0	0
0	1	0
0	0	1

4. 4/4 points | Previous Answers KolmanLinAlg9 7.2.017.

A matrix A is called **defective** if A has an eigenvalue λ of multiplicity $m > 1$ for which the associated eigenspace has a basis of fewer than m vectors; that is, the dimension of the eigenspace associated with λ is less than m. Use the eigenvalues of the following matrices to determine which matrices are defective.

(a) $\begin{bmatrix} 7 & 6 \\ 0 & 7 \end{bmatrix}$, $\lambda = 7, 7$

- (•) defective
- ( ) not defective

(b) $\begin{bmatrix} 9 & 0 & 0 \\ 4 & 9 & 4 \\ -4 & 0 & 5 \end{bmatrix}$, $\lambda = 9, 9, 5$

- ( ) defective
- (•) not defective

(c) $\begin{bmatrix} 4 & 4 & 4 \\ 4 & 4 & 4 \\ -4 & -4 & -4 \end{bmatrix}$, $\lambda = 0, 0, 4$

- ( ) defective
- (•) not defective

(d) $\begin{bmatrix} 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & -3 \\ 3 & 0 & 0 & 0 \\ 0 & -3 & 0 & 0 \end{bmatrix}$, $\lambda = 3, 3, -3, -3$

- ( ) defective
- (•) not defective

5. 4/4 points | Previous Answers KolmanLinAlg9 7.2.019.

Let $A = \begin{bmatrix} 6 & -8 \\ 4 & -6 \end{bmatrix}$. Compute A^9. (*Hint*: Find a matrix P such that $P^{-1}AP$ is a diagonal matrix D and show that $A^9 = PD^9P^{-1}$.)

1536	-2048
1024	-1536