WebAssign
CH B.2 (Homework)

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

Current Score : 20 / 20 **Due :** Thursday, April 18 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

1. 4/4 points | Previous Answers KolmanLinAlg9 B.2.001.

Solve by using Gauss-Jordan reduction. (If there is no solution, enter NO SOLUTION.)

(a)
$$\begin{aligned}(1+2i)x_1 + (-2+i)x_2 &= 3-9i\\ (2+i)x_1 + (-1+2i)x_2 &= -3-3i\end{aligned}$$

$(x_1, x_2) = \left(\quad \right)$

(b)
$$\begin{aligned}2ix_1 - (1-i)x_2 &= 5+5i\\ (1-i)x_1 + x_2 &= 5-5i\end{aligned}$$

$(x_1, x_2) = \left(\quad \right)$

(c)
$$\begin{aligned}(1+i)x_1 - x_2 &= -1\\ 2ix_1 + (1-i)x_2 &= i\end{aligned}$$

$(x_1, x_2) = \left(\quad \right)$

2. 4/4 points | Previous Answers KolmanLinAlg9 B.2.003.

Solve by Gaussian elimination with back substitution.

(a)
$$\begin{aligned} ix_1 + (1+i)x_2 &= 1 \\ (1-i)x_1 + x_2 - ix_3 &= 1 \\ ix_2 + x_3 &= 1 + 2i \end{aligned}$$

$(x_1, x_2, x_3) = \Big(\qquad \Big)$

(b)
$$\begin{aligned} 3x_1 + ix_2 + (1-i)x_3 &= 2 + i \\ ix_1 + (4+i)x_3 &= -1 + 4i \\ 5ix_2 - x_3 &= 5 - i \end{aligned}$$

$(x_1, x_2, x_3) = \Big(\qquad \Big)$

3. 4/4 points | Previous Answers KolmanLinAlg9 B.2.004.

Compute the determinant and simplify as much as possible.

(a) $\begin{vmatrix} 1+i & -1 \\ 4i & 1+i \end{vmatrix}$

(b) $\begin{vmatrix} 5-i & 1+i \\ 1+5i & -(1-i) \end{vmatrix}$

(c) $\begin{vmatrix} 4+i & 3 & 5-i \\ i & 0 & 5+i \\ -3 & 4 & 1+3i \end{vmatrix}$

(d) $\begin{vmatrix} 3 & 1-i & 0 \\ 1+i & -1 & i \\ 0 & -i & 3 \end{vmatrix}$

4. 4/4 points | Previous Answers KolmanLinAlg9 B.2.005.

Find the inverse of each of the following matrices, if possible. (If there is no solution, enter NONE in any single cell.)

(a) $\begin{bmatrix} i & 4 \\ 1+i & -i \end{bmatrix}$

4/25+3i/25	12/25−16i/25
7/25−i/25	−4/25−3i/25

(b) $\begin{bmatrix} 2 & i & 3 \\ 1+i & 0 & 1-i \\ 2 & 1 & 2+i \end{bmatrix}$

i/6	1/6−i/2	1/6
−1/3−i/2	i/3	1/2+i/3
1/6	i/3	−i/6

5. 4/4 points | Previous Answers KolmanLinAlg9 B.2.011.

Find the eigenvalues and associated eigenvectors of the following complex matrices. (Consider "$c - i$" to be a smaller value than "$c + i$," assuming c is a positive real number.)

(a) $A = \begin{bmatrix} 4 & 1 \\ -1 & 4 \end{bmatrix}$

$\lambda_1 =$ $\mathbf{x}_1 = $ [i, 1] (smaller λ-value)

$\lambda_2 =$ $\mathbf{x}_2 = $ [−i, 1] (larger λ-value)

(b) $A = \begin{bmatrix} 3 & i \\ -i & 3 \end{bmatrix}$

$\lambda_1 =$ $\mathbf{x}_1 = $ [−i, 1] (smaller λ-value)

i

$\mathbf{x}_2 =$ 1 (larger λ-value)

$\lambda_2 =$

(c) $A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & i \\ 0 & -i & 5 \end{bmatrix}$

$\lambda_1 =$

$\mathbf{x}_1 = \begin{bmatrix} 0 \\ -i \\ 1 \end{bmatrix}$ (smallest λ-value)

$\lambda_2 =$

$\mathbf{x}_2 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$

$\lambda_3 =$

$\mathbf{x}_3 = \begin{bmatrix} 0 \\ i \\ 1 \end{bmatrix}$ (largest λ-value)