

M346 (55820), Homework #4

Due: 12:00pm, Friday, Feb. 17

Instructions: Questions are from the book “Applied Linear Algebra, 2nd ed.” by Sadun. Please show all your work, not only your final answer, to receive credit. Keep answers organized in the same order the problems have been assigned.

Introduction to eigenvalues and eigenvectors (4.1)

p. 59, #1, 3, 6

Basis of eigenvectors (4.2)

p. 61, #3, 4, 6

[Hint: For #6, show that the matrices $A - \lambda_i I$ commute—that is, $(A - \lambda_i I)(A - \lambda_j I) = (A - \lambda_j I)(A - \lambda_i I)$ for any i and j .]

Characteristic polynomial and diagonalization (4.3)

p. 66-67, #4, 6, 7, 8, 10, 11, 13

In addition:

- A) In Section 4.3 problems #4, 6, 7, 8, also diagonalize the given matrices by expressing them as $A = PDP^{-1}$ for some D and P (if possible).
- B) If a matrix A is triangular (upper- or lower- triangular) with diagonal entries a_{11}, \dots, a_{nn} , what are its eigenvalues? [Hint: The characteristic polynomial $p_A(\lambda)$ takes a simple form in this case.]