Math 113: Linear Algebra and Matrix Theory

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Homework 5

Due Wednesday, October 28 in class.

Do all the following exercises, but write up only the **unstarred exercises** and the **questions** below. (Starred exercises are valuable and worth working out, but they will not be collected or graded.)

5C.1* **5C.2** 5C.8* 5C.14*
8C.8*

Question 1.

a) Give an example of an operator T on $V = \mathbb{C}^3$ whose minimal polynomial is $(x+2)^2$.

b) Give an example of an operator S on $W = \mathbb{C}^5$ whose minimal polynomial is $(x^2+1)(x-3)^2$.

c) What are the eigenvalues of the operators T and S in parts a) and b)?

Question 2. Let $V = \mathbb{R}^4$, and let $T \in \mathcal{L}(V)$ be the operator with matrix

$$\begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 3 & 0 & 1 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 3 \end{bmatrix}$$

Find the minimal polynomial of T.