Math 220 Assignment

December 3, 2001

Relevant Sections of the Course Textbook

Chapter 1 §§ 1–7

Chapter 2 §§ 1–8

Chapter 3 §§ 1–5

Chapter 4 §§ 1–3, 5

Chapter 5 §§ 1, 2

Chapter 6 §§ 1, 2, 4–7

(Additionally, there has been passing mention of § 4 in Chapter 4 and of topics in Chapter 7. There will be no testing on these supplementary topics.)

Due Wednesday, December 5

The geometric significance of an $n \times n$ matrix that is similar to a diagonal matrix is that the corresponding linear transformation carries each line in some set of n lines, in "general position" passing through the origin, to itself.

1. What is a more precise description of the phrase *general position* in the preceding statement?

2. What is the set of n lines when $n = 2$ and the matrix is

$$\begin{pmatrix} 5 & 12 \\ -12 & 5 \end{pmatrix} ?$$

3. Find an example with $n = 2$ where the said set of 2 lines in general position is a pair of non-parallel lines through the origin that, instead of being perpendicular, form the angle $\pi/4$ (i.e., 45 degrees) at the origin.

4. Show that the matrix

$$\begin{pmatrix} 2 & 1 \\ 0 & 2 \end{pmatrix}$$

   is not similar to a diagonal matrix.

5. What geometric property might be said to characterize the $n \times n$ matrices that are similar to upper triangular matrices?

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