Math 40 - Section —
HW 10 - Similarity and Diagonalization
Friday, February 26, 2016

4.4.{10, 12, 22, 44, 46, 48}

4.4.10 Determine whether A is diagonalizable and, if so, find an invertible matrix P and a diagonal matrix D such that $P^{-1}AP = D$.

$$A = \begin{bmatrix} 3 & 1 & 0 \\ 0 & 3 & 1 \\ 0 & 0 & 3 \end{bmatrix}$$

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4.4.12 Determine whether A is diagonalizable and, if so, find an invertible matrix P and a diagonal matrix D such that $P^{-1}AP = D$.

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

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4.4.22 Use the method of Example 4.29 to compute the indicated power of the matrix.

$$\begin{bmatrix} 2 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 2 \end{bmatrix}^k$$

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4.4.44 Let A be an invertible matrix. Prove that if A is diagonalizable, so is A^{-1}.

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4.4.46 Let A and B be $n \times n$ matrices, each with n distinct eigenvalues. Prove that A and B have the same eigenvectors if and only if $AB = BA$.

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4.4.48 Let A and B be similar matrices. Prove that geometric multiplicities of the eigenvalues of A and B are the same. [*Hint*: Show that, if $B = P^{-1}AP$, then every eigenvector of B is of the form $P^{-1}\mathbf{v}$ for some eigenvector $\mathbf{v}$ of A.]

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