Section 7.2  Diagonalization and Similar Matrices

Definition  If $A$ and $B$ are $n \times n$ matrices, we say that $B$ is similar to $A$ if

In many situations, we need to compute powers of a matrix $A$.

Theorem  Similar matrices

Proof
Definition  If a matrix $A$ is similar to a diagonal matrix, we say

Remark: An $n \times n$ matrix $A$ is diagonalizable if and only if

Example 1. *Are the following matrices diagonalizable?*

$$A = \begin{bmatrix} 1 & 1 \\ -2 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$$
If $A$ is similar to a diagonal matrix $D$, then $P^{-1}AP = D$ for some nonsingular matrix $P$.

**Question:** How to construct $P$?

**Example 2.** Let $A = \begin{bmatrix} 1 & 1 \\ -2 & 4 \end{bmatrix}$ (the same matrix in Example 1). Find a matrix $P$ such that $P^{-1}AP = D$. 

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