20240416 (Tue)

Last time: Intro to "diagonalization"

Given a square matrix A, under what conditions can we write

$$A = PDP^{-1} \text{ with } D = \begin{bmatrix} d_1 & 0 & \cdots & 0 \\ 0 & \ddots & & \vdots \\ \vdots & & \ddots & 0 \\ 0 & \cdots & 0 & d_n \end{bmatrix}$$

$d_1, \ldots, d_n$ ← eigen values

Writing $P = [\bar{v}_1 \ldots \bar{v}_n]$ in column form

← columns are eigen vectors

We must have

$$\left.\begin{aligned} A\bar{v}_1 &= d_1\bar{v}_1 \\ &\vdots \\ A\bar{v}_n &= d_n\bar{v}_n \end{aligned}\right\}$$

$d_1, \ldots, d_n$ are eigen values of A and $\bar{v}_1, \ldots, \bar{v}_n$ are corresponding eigen vectors