

How to determine if a square matrix is diagonalizable

A $n \times n$ -matrix

Is A symmetric? $\xrightarrow{\text{Yes}}$ A diagonalizable

\downarrow No

Does A have n eigenvalues $\lambda_1, \lambda_2, \lambda_3, \dots, \lambda_n$ (counted with multiplicity)? $\xrightarrow{\text{No}}$ A not diagonalizable

\downarrow Yes

Is the multiplicity of λ_i equal to the number of degrees of freedom of the equation $(A - \lambda_i I) \cdot \underline{x} = \underline{0}$ for all eigenvalues λ_i ? $\xrightarrow{\text{Yes}}$ A diagonalizable

\downarrow No

A not diagonalizable

It is enough to check those eigenvalues with multiplicity > 1 (The answer is always yes for eigenvalues of multiplicity one)