4c - Eigenstuff

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- **Thrm 4.22** - Let A & B be nxn matrices. Then;
  a) det A = det B
  b) A is invertable iff B is invertable
  c) A & B have the same rank
  d) A & B have the same characteristic polynomical
  e) A & B have the same eigenvalues
  f) $A^m \sim B^m$ for all intergers $m \geq 0$ (for all intergers if invertable)
- Two matrices can have these properties in common and still not be similar...
- Thrm 4.22 better used to show 2 matrices are not similar

  - **Diagonisable** if there is a diagonal matrix D such that A is similar to D ($P^{-1}AP = D$)

- **Thrm 4.23** - Solving Diagon Alley $\longrightarrow P = \begin{bmatrix} [\varepsilon_1] & [\varepsilon_2] & [\varepsilon_n] \end{bmatrix}, D = \begin{bmatrix} \lambda_1 & 0 & 0 \\ 0 & \lambda_2 & 0 \\ 0 & 0 & \lambda_n \end{bmatrix}$
  A is diagonisable iff A has LI eigenvectors;
  Specifically, $P^{-1}AP = D$ is satisfied iff columns of p are n linearly independant eigen vectors of A and the diagonal entries of D are the eigenvalues o A corresponding in the same order
- **Thrm 2.42** - the total colection of basis vectors for all eigenspaces are LI
- **Thrm 4.25** - If a is an nxn matrix with n distinct Evalues, then a is diagonisable

* **Thrm 4.27** - The Diagonalisation Theorem
  Let A be an nxn matrix whose distinct Evalues are $\lambda_1, \lambda_2 \ldots \lambda_k$, the following statments are equivalent;
  a) A is diagonisable
  b) The union B of the bases of the Espace of A contains n vectors
  c) The algebraic multiplicity of each Evalue equals is geometric multiplicity