Objectues - Symmetric. matrices A 2 AT A Eigenvalues / Eigenvectors - START: Positive Definite Matries

-Symetric matrices

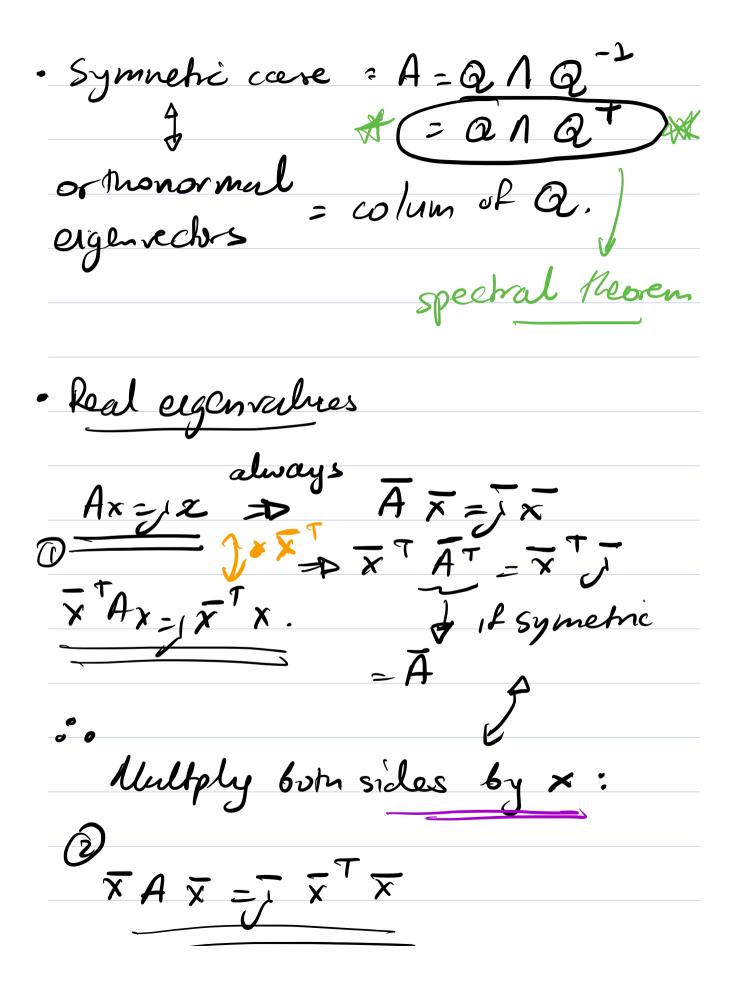
AT = A

Deigenralues are REAL

Dougenrectors are PERPENDICULAR CORTHOGONAL)

(can be chosen)

· Usual case: A = SAS^-1



Company tre two equations we can see that

X J x = X J x Length square

Lounless XX 20 THEN:

How do we know that x x x \$0

$$\overline{x}^{T} \times = \left(\overline{x}, \overline{x}, \overline{x}, \overline{x}, \overline{x}\right)$$

$$\begin{array}{c}
x_{1} \\
x_{2} \\
\vdots \\
x_{n}
\end{array}$$

 $= \sum_{x} x + \chi_{x} x + \dots$

(a-ib) (a+ib) $=a^{2}+b^{2}$ $\Rightarrow |x_{1}|^{2}+|x_{2}|^{2}+\cdots+|x_{n}|^{2}$

Good methos: A-ĀT

-keal, 's

-kerpendeceder x's

Symphie natives.

Projection onto eigenrectors If AAT we can write: AzanaT 21-9-1+1222272+~~+1n9n9n projection nahr.

- Every symmetric matrix is a combination of perp projection matrices.

Note: For symmetre naprees

number of positive prots

number of positive cegénseulus.

Because the eigenvalues of A + bI are just b more than the eigenvalues of A, we can use this fact to find which eigenvalues of a symmetric matrix are greater or less than any real number b. This tells us a lot about the eigenvalues of A even if we can't compute them directly.

Positire definite mentrices

Lo is a symmetric matrix. A for which all eigenvalues are positive. O orrote are positive.

All subdeterments are positive.

Let A2 [5 2]

prots of natrix are: 5 & det (A)

= 11/5

-D Ergenvalues: 12-8, +11 =0

12=4+15 52=4-55

dekermmennt?

1-10 Not

