Rank of matrix

if simple elements haru cha vani find garna lai turn matrix to echelon form ani tespachi aaucha

if number haru complex cha calculate garna time lagcha vani

use calc to find determinant of 3 if d.3 = 0, d.3 not equal = vaye rank is 3 find d.2, if d.2 = 0 find every d.2 inside matrix,rank 2

Topics for Linear Algebra

Transformation

5. Least Squares

2. Rank, Spaces and Span

3 Orthogonality & Projections

4. SVD and Eigen Decomposition

✓ Projection of vector b onto vector a:

• The result is a vector in the direction of a

• This formula gives you the vector projection of b onto a.

 $\operatorname{proj}_{\mathbf{a}}\mathbf{b} = \frac{\mathbf{a} \cdot \mathbf{b}}{\mathbf{a} \cdot \mathbf{a}}\mathbf{a}$

Suppose we have:

$$A=egin{bmatrix}1&1\2&1\3&1\end{bmatrix},\quad b=egin{bmatrix}1\2\2\end{bmatrix}$$

We want to solve:

Ax = b

But this system is overdetermined (3 equations, 2 unknowns). So we solve:

 $A^TAx = A^Tb$

Which gives us the least squares solution.

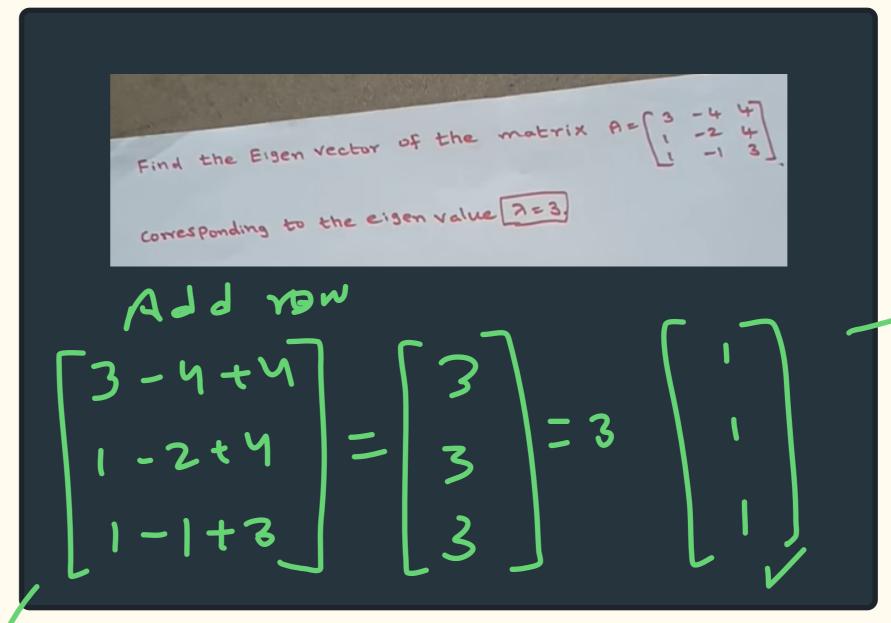
$$A^TA = egin{bmatrix} 1 & 2 & 3 \ 1 & 1 & 1 \end{bmatrix} \cdot egin{bmatrix} 1 & 1 \ 2 & 1 \ 3 & 1 \end{bmatrix} = egin{bmatrix} 14 & 6 \ 6 & 3 \end{bmatrix}$$

$$A^Tb = egin{bmatrix} 1 & 2 & 3 \ 1 & 1 & 1 \end{bmatrix} \cdot egin{bmatrix} 1 \ 2 \ 2 \end{bmatrix} = egin{bmatrix} 13 \ 5 \end{bmatrix}$$

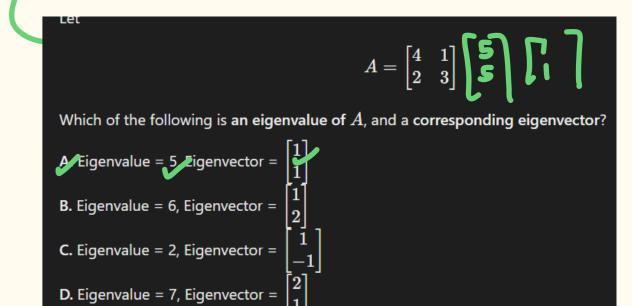
Step 2c: Solve the normal equation:

$$egin{bmatrix} 14 & 6 \ 6 & 3 \end{bmatrix} \cdot egin{bmatrix} m \ b \end{bmatrix} = egin{bmatrix} 13 \ 5 \end{bmatrix}$$

y=1.5x-1.33



jaile trace sanga milcha vanne hunna kaile kai add row



The eigen values of Matrix
$$A = \begin{pmatrix} 5 \\ 1 \\ 2 \end{pmatrix}$$
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sum of eigen value = sum of trace (diagonal)
$$(a) 6, 0$$

$$(b) 6, 1$$

$$(c) 3, 2$$

$$(d) 1, 2$$

Given
$$[A]_{3\times3} \longrightarrow \mathcal{E}$$
igen value?
 $\lambda^3 - (\text{Trace of } A)\lambda^2 + (\text{Sum of principle diagonal minors})\lambda$
 $-|A| = 0$
 $\mathbb{E}\times\mathbb{I}$ $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$
 $\lambda^3 - (18)\lambda^2 + (5+20+20)\lambda - 0 = 0$
 $\lambda(\lambda^2 - 18\lambda + 45) = 0$
 $\lambda = 0, 3, 15$