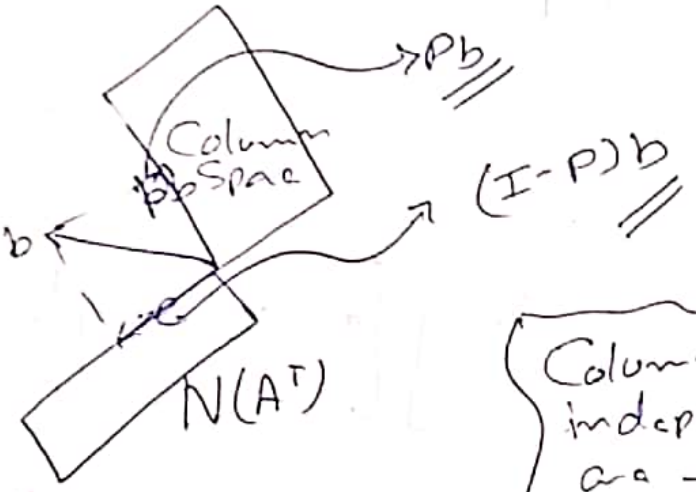
Lecture-16

→ Projections
→ least Square & best Straight line.

$$P = A(A^TA)^{-1}A^T$$

↖ Projection matrix



Columns are definitely independent if they are ⊥ unit vectors

↓

Orthonormal Vectors

$$A(A^TA)^{-1}A^Tb = A\hat{x}$$

$$\boxed{A^TA\,\hat{x} = A^Tb}$$

If A has independent Columns then A^TA is invertible.

⇒ Suppose. $A^TAx = 0$ { Matrix is invertible if its null space is Only Zero }

x must be 0.

$$x^TA^TAx = 0$$

$$\Rightarrow (Ax)^T(Ax) = 0 \longrightarrow Ax = 0$$

$$\rightarrow x = 0 \quad \{\text{as A has Independent Columns}\}$$