

## Step-1

Given  $P_C = A(A^T A)^{-1} A^T$  is the projection onto the column space of  $A$ , we have to find the projection  $P_R$  onto the row space.

Suppose  $V$  is the column space of  $A$

Then  $V$  is the row space of  $A^T$

So replace  $A$  by  $A^T$  in  $P_C$  we get  $P_R$

## Step-2

The projection  $P_R$  onto the row space

$$= A^T \left[ (A^T)^T A^T \right]^{-1} (A^T)^T$$

$$= \boxed{A^T (A A^T)^{-1} A}$$