Step-1

Given $P_C = A\left(A^T A\right)^{-1} A^T$ 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

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

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