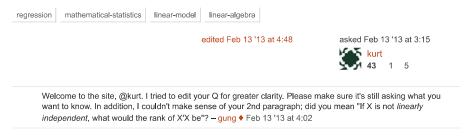
Why does the rank of the design matrix X equal the rank of X'X?



Why does the rank of the design matrix ${\pmb X}$ equal the rank of ${\pmb X}'{\pmb X}$? Is this true in all circumstances?

If X is not linearly independent, what would the rank of X'X be?



1 Answer

For any matrix X, R(X'X) = R(X). Where R() is the rank function.

Really appreciate it !!! - kurt Feb 14 '13 at 5:13

You could prove this using null space. If Xz=0 for some z, then clearly X'Xz=0. Conversely, if X'Xz=0, then z'X'Xz=0, and it follows that Xz=0. This implies X and X'X have the same null space. Hence the result.

