

## Notes for Module 4 Lecture 4C

### Slide #5

In the F test  $F_0$ , how is  $\mathbf{T}(\mathbf{X}'\mathbf{X})^{-1}\mathbf{T}'$  derived? Here is the derivation: Recall that  $\widehat{\text{Var}}(\hat{\boldsymbol{\beta}}) = \hat{\sigma}^2(\mathbf{X}'\mathbf{X})^{-1}$ . Thus,  $\widehat{\text{Var}}(\mathbf{T}\hat{\boldsymbol{\beta}}) = \hat{\sigma}^2\mathbf{T}(\mathbf{X}'\mathbf{X})^{-1}\mathbf{T}'$ .

### Slide #6

Recall  $C_{jj}$  is the  $j$ -th diagonal element of  $(\mathbf{X}'\mathbf{X})^{-1}$ .