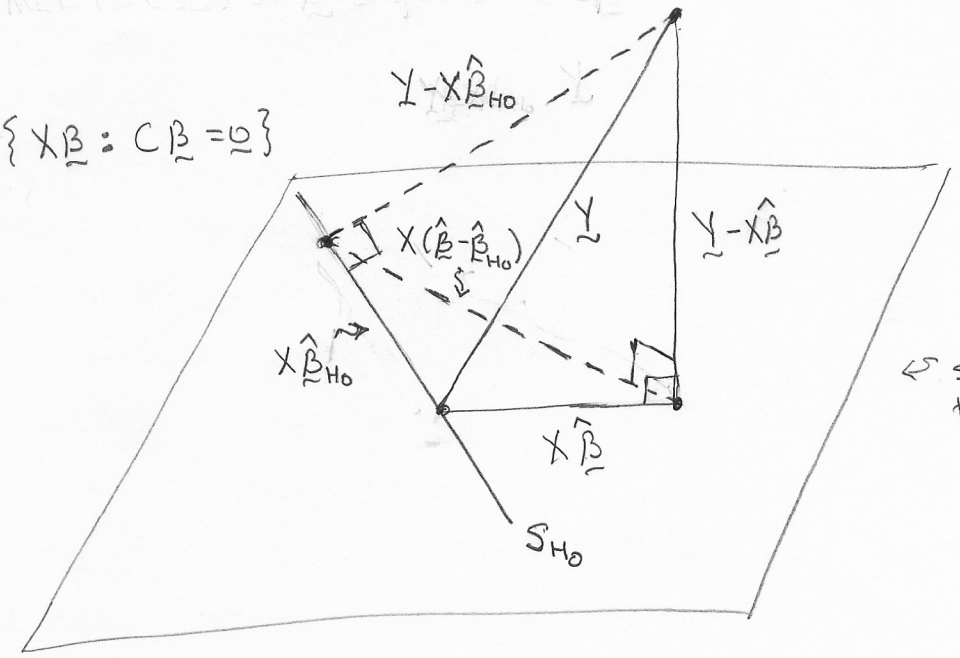
$H_0: C\underset{\sim}{\beta} = \underset{\sim}{0}$ or $H_0: \mu_1 = \mu_2 = \dots = \mu_g$

$\hat{\underset{\sim}{\beta}}_{H_0}$ = MLE (or LSE) of $\underset{\sim}{\beta}$ subject to $H_0: C\underset{\sim}{\beta} = \underset{\sim}{0}$

Space $S_{H_0} = \{X\underset{\sim}{\beta} : C\underset{\sim}{\beta} = \underset{\sim}{0}\}$



↩ space spanned by the columns of X

$$\| \underset{\sim}{Y} - X\hat{\underset{\sim}{\beta}} \|^2 + \| X(\hat{\underset{\sim}{\beta}} - \hat{\underset{\sim}{\beta}}_{H_0}) \|^2 = \| \underset{\sim}{Y} - X\hat{\underset{\sim}{\beta}}_{H_0} \|^2$$

$$SSE + \| X(\hat{\underset{\sim}{\beta}} - \hat{\underset{\sim}{\beta}}_{H_0}) \|^2 = SSE_{H_0}$$

$$SSE_{H_0} - SSE = \| X(\hat{\underset{\sim}{\beta}} - \hat{\underset{\sim}{\beta}}_{H_0}) \|^2$$

$$\underset{\sim}{Y}'(H - \tfrac{1}{n}J)\underset{\sim}{Y} = \| X(\hat{\underset{\sim}{\beta}} - \hat{\underset{\sim}{\beta}}_{H_0}) \|^2$$

$$\hat{\underset{\sim}{\beta}}_{H_0} = \hat{\underset{\sim}{\beta}} + (X'X)^{-1}C'[C(X'X)^{-1}C']^{-1}(\underset{\sim}{0} - C\hat{\underset{\sim}{\beta}})$$

$$\underset{\sim}{Y}'(H - \tfrac{1}{n}J)\underset{\sim}{Y} = (C\hat{\underset{\sim}{\beta}})'[C(X'X)^{-1}C']^{-1}C\hat{\underset{\sim}{\beta}}$$