

Recall that

1. Refer to HW08 and data `Robey.txt`. Obtain type I anova and type II anova for the two linear models:

`tfr ~ region+contraceptors+region:contraceptors`

and

`tfr ~ contraceptors+region+region:contraceptors`

Observe the models are the same but the main effects are in different order. Obtain type I anova (`anova` in R) and type II anova (`anova` in R) output for both models.

- a) Interpret each line of the output for type I and type II anova for the first model, i.e., state the null and alternative hypothesis, conclusion, and interpretation for each line of each output.
 - b) Observe that type II anova provides exactly the same output for both models, but type I anova doesn't. Determine when the output is different and explain why.
 - c) Using F-tests to compare full and reduced models, choose the most appropriate model. Do you obtain the same conclusions you obtained previously (in HW08)? Explain why or why not.
2. Let $E(\mathbf{Y}|\mathbf{X}) = \mathbf{X}\boldsymbol{\beta}$ and $Var(\mathbf{Y}) = \sigma^2\mathbf{W}^{-1}$. Show that if $\mathbf{X}^* = \mathbf{W}^{1/2}\mathbf{X}$ and $\mathbf{Y}^* = \mathbf{W}^{1/2}\mathbf{Y}$, then

$$\hat{\boldsymbol{\beta}} = (\mathbf{X}^{*\top}\mathbf{X}^*)^{-1}\mathbf{X}^{*\top}\mathbf{Y}$$

is the weighted least squares coefficient estimator for $\boldsymbol{\beta}$

3. From ALR 7.6 (7.6.1 to 7.6.4.)