

PSYC 5086: Advanced Statistical Methods

Tarleton State University

Unit 4 Homework

1. A sample of $N = 4$ subjects each performs an attentional networks task under three separate conditions (labeled A, B, and C). The scores for each subject and condition are presented in the table below:

Subject	Condition A	Condition B	Condition C
#1	3	2	1
#2	7	5	6
#3	6	3	6
#4	4	2	3

- Write the full model for the data, specifying point estimates for the grand mean μ , treatment effects α_j , and subject effects π_i .
 - Test the constrained model $\mathcal{H}_0 : \alpha_j = 0$ against the full model in part (a). Report both a p -value and a Bayes factor.
 - What can you conclude from part (b)?
2. The following data were collected from a repeated measures study:

Subject	Treatment A	Treatment B	Treatment C	Treatment D
#1	6	3	3	0
#2	4	4	2	2
#3	4	2	0	2
#4	6	3	3	0

- Write the full model for the data, specifying point estimates for the grand mean μ , treatment effects α_j , and subject effects π_i .
 - Test the constrained model $\mathcal{H}_0 : \alpha_j = 0$ against the full model in part (a). Report both a p -value and a Bayes factor.
 - What can you conclude from part (b)?
3. The following data were collected from a repeated measures study:

Subject	1	2	3	4
Treatment A	2	2	4	0
Treatment B	6	6	4	4

- Compute a t -statistic for the *differences* between Treatment A and Treatment B.
- Compute an F -ratio for a repeated measures ANOVA on the data.
- Is there a relationship between the obtained t and F scores? Explain.