Online Homework System

Assignment Worksheet
*6/15/20 - 12:05:57 PM EDT*

**Name:** _____ **Class:**
**Class #:** _____ **Section #:** _____
**Instructor:** Nathaniel Stevens **Assignment:** Quiz 5

**Question 1: (3 points)**

Instagram is experimenting with a new feature that is displayed once someone is "All Caught Up" on their social feed. When a user in the "treatment" condition has viewed all new posts, they are given the option to view "Older" posts they have already seen, or view "Suggested" posts algorithmically recommended by Instagram. Users in the control condition see just "Older" posts without being given a choice. Interest lies in determining how long a user spends on Instagram *after* getting "All Caught Up". If the new feature is successful, users may on average engage with the app longer. However, time-of-day may also infuence the length of time a user engages with the app. To control for this, the experiment is run from 12:00-1:00pm EST, and replicated separately between 7:00-8:00pm EST. Additionally, iPhone and Android users may differ systematically in their use of Instagram. However, the experimenters choose not to control for this and hope that by randomly assigning users to conditions, such differences will be mitigated.

Match each of the factors described above to the correct label.

_____

Design: "All Caught Up" transition
Nuisance: Time-of-day
ATU: Device type

**Question 2: (1 point)**

Suppose that a randomized complete block design is used to experiment with a design factor that has 4 levels while controlling for a nuisance factor that has 7 levels. A regression is used to analyze the data collected. Which of the following represents an appropriate linear predictor in this regression model?

**(a)** $\alpha + \beta_1 x_1 + \ ... \ + \beta_4 x_4 + \gamma_1 z_1 + \ ... \ + \gamma_6 z_6$

**(b)** $\alpha + \beta_1 x_1 + \ ... \ + \beta_4 x_4 + \gamma_1 z_1 + \ ... \ + \gamma_7 z_7$

**(c)** $\alpha + \beta_1 x_1 + \ ... \ + \beta_3 x_3 + \gamma_1 z_1 + \ ... \ + \gamma_7 z_7$

**(d)** $\alpha + \beta_1 x_1 + \ ... \ + \beta_3 x_3 + \gamma_1 z_1 + \ ... \ + \gamma_6 z_6$

**Question 3: (1 point)**

Suppose that a randomized complete block design has 25 replicates, a design factor with 2 levels and a nuisance factor with 7 levels. What are the degrees of freedom associated with the likelihood ratio test of the significance of the nuisance factor?

_____

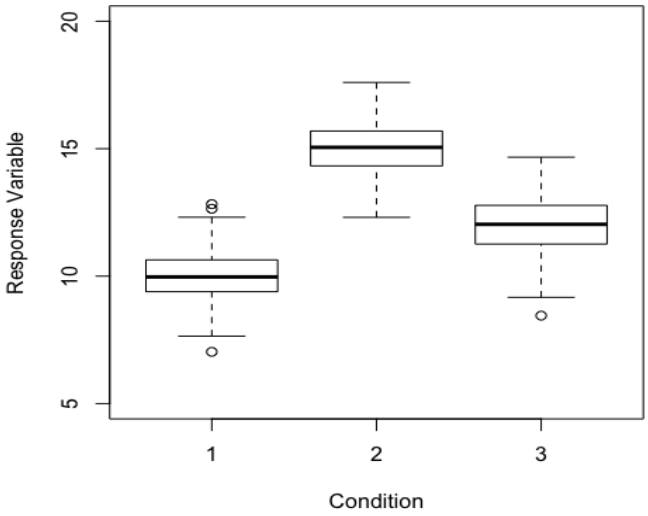
**Question 4: (9 points)**

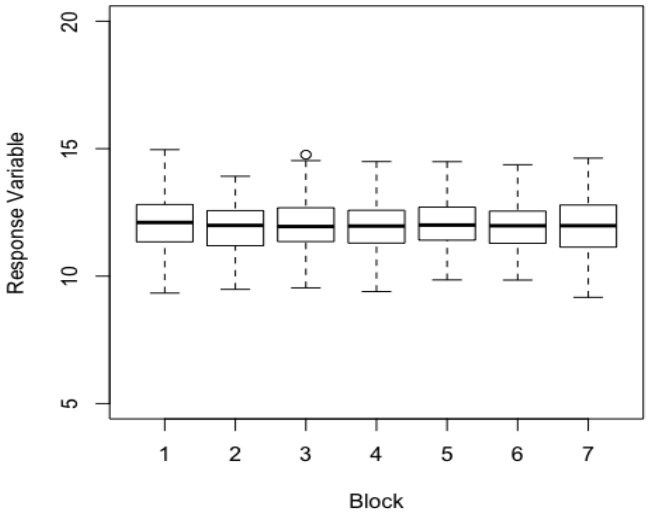
A randomized complete block design was used to determine whether a continuous response variable is significantly influenced by a design factor (with 3 levels) while controlling for the influence of a nuisance factor (with 6 levels). A partially complete ANOVA table for this experiment is shown below. Fill in the missing cells of this table. Round your sums of squares to the nearest integer and your mean squares and test statistics to 1 decimal place.

| Source | SS | df | MS | Test Stat. |
|---|---|---|---|---|
| Condition | 1,484 | | | |
| Block | | | 107.4 | |
| Error | | 1,992 | | |
| Total | 8,978 | | | |

**Question 5: (2 points)**

Suppose that a randomized complete block design is performed to evaluate the significance of a design factor with $m = 3$ levels while controling for the effect of a nuisance factor with $b = 7$ levels. Boxplots of the continuous response variable are shown below.




Does the design factor appear to have a significant influence on the response variable? Yes

Does blocking seem like it was necessary? No