COMPUTATIONAL PHYSIOLOGY LAB

Problems

1. An apartment owner believes that more of her poolside apartments are leased by single occupants than by those who share an apartment. The data in below table were collected from current occupants. Do the data support her hypothesis?

Pool	Type Single	Type Multiple	Total
YES	22	23	45
NO	24	31	55
Total	46	54	100

2. To determine the gender balance of various job positions the personnel department of a large firm took a sample of employees from three job positions. The three job positions and the gender of employees from the sample are shown in **Q2.txt**. Use the hierarchical approach to log-linear modeling to determine which model best fits the data. Explain the results.

3. Three teaching methods were tested on a group of 18 students with homogeneous backgrounds in statistics and comparable aptitudes. Each student was randomly assigned to a method and at the end of a 6-week program was given a standardized exam. Because of classroom space, the students were not equally allocated to each method. The results are shown here:

Method		
1	2	3
94	82	89
87	85	68

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90	79	72
74	84	76
86	61	69
97	72	
	80	

    a. Test for a difference in distributions of test scores for the different teaching methods using the Kruskal–Wallis test.

    b. If there are differences, explain the differences using a multiple comparison test.

4. Eight human molar teeth were sliced in half. For each tooth , one randomly chosen half was treated with a compound designed to slow loss of minerals; the other half served as a control. All tooth halves were then exposed to a demineralizing solution. The response is percent of mineral content remaining in the tooth enamel. The data are given here :

Mineral Content								
Control	66.1	79.3	55.3	68.8	57.8	71.8	81.3	54
Treated	59.1	58.9	55	65.9	54.1	69	60.2	55.5

(a) Perform the Wilcoxon signed rank test to determine whether the treatment maintained a higher mineral content in the enamel.
(b) Computer the paired t statistic and compare the results. Comment on the differences in the results.

5. This problem concerns about rice yield experiment. The response is yield per experimental plot. The experiment was conducted as a randomized block for three years where the blocks are the same for each year. The factors are:

    Var: three varieties, coded A, B, and C, and
    Nit: two levels of nitrogen application, coded 80 and 160.

The data are given in **Q5.png**.
Each field(REP) is a subject , and there are 18 measurements(YR, VAR, NIT) per subject.

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(a) Construct a cell mean plot that will help you understand the effects of variety and nitrogen.

(b) Carry out the analysis, focusing on the impact of VAR and NIT, and treating all three factors as fixed. (Hint: This is an extension of the repeated measures with two within-subject factors. The test for any of the fixed effects uses the interaction of that effect with REP for the denominator).

(c) How does the treatment of YR as a fixed effect impact the interpretation of the results?

Submission

- Zip your submission folder (contains code, documents, pdf, and plots) and submit to blackboard. Name your zip file "**FirstName_LastName_HW4.zip**". One submission per individual.
- The homework should be submitted on BlackBoard by **11.59pm on April 27**, **2019**.
- The homework report should be a pdf generated in Latex with figures from R only. All the figures and plots should have appropriate labels, titles and annotations.
- The code should also be provided.

Grading
Total points **25 pts** (5 pts each)

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