**Statistics for Psychology - PSYCH-UH 1004Q**

**Homework #8**

38 points

(The homework assignments will never require you to use R unless the problem explicitly says “use this R code”. For other problems, can use R if you find it useful, they should be completed easily by hand.)

1. a. If 120 subjects are divided equally among three groups, what is dfB and dfW? (2 points)

dfB:

dfW:

b. With the dfs defined in (a), what is the critical *F*-value for a test with α=0.05? Use the function qf(). (1 point)

2. A social psychologist wants to know how long people will wait before responding to cries for help from an unknown person and whether the assumed gender or assumed age of the person in need of help makes any difference. One at a time, subjects sit in a room waiting to be called for an experiment. After a few minutes they hear cries for help from the next room, which are actually on a tape recording. The cries are in either a voice stereotypically perceived to be an adult male’s, an adult female’s, or a child’s voice; seven subjects are randomly assigned to each condition. The dependent variable is the number of seconds from the time the cries begin until the subject gets up to investigate or help.

|  |  |  |
| --- | --- | --- |
| **Child Voice** | **Adult Female Voice** | **Adult Male Voice** |
| 10 | 17 | 20 |
| 12 | 13 | 25 |
| 15 | 16 | 14 |
| 11 | 12 | 17 |
| 5 | 7 | 12 |
| 7 | 8 | 18 |
| 2 | 3 | 7 |

To import the data in R, use the following line of code. This way, you will have a long-format dataset to work on.

data <- structure(list(condition = c("child", "female", "male", "child",

"female", "male", "child", "female", "male", "child", "female", "male", "child", "female", "male", "child", "female", "male", "child", "female", "male"), time = c(10, 17, 20, 12, 13, 25, 15, 16, 14, 11, 12, 17, 5, 7, 12, 7, 8, 18, 2, 3, 7)), class = "data.frame", row.names = c(NA, -21L))

1. State the null hypothesis in prose. (1 points)
2. State the formula to calculate the *F-*ratio just using the terms MSB and MSW. (This is its simplest form!) (2 points)
3. State the formula for $MS\_{B}$ in the format that we used in lecture for calculations. (2 points)
4. State the formula for $MS\_{W}$ in the format that we used in lecture for calculations. (2 points)
5. Calculate the following quantities that we will need to calculate an ANOVA. You can use R or do it by hand (your choice). (7 points)

Mean of child group:

Mean of adult male group:

Mean of adult female group:

Grand mean of all three groups:

Variance of child group:

Variance of adult male group:

Variance of adult female group:

1. Calculate $MS\_{B}$. Plug in the values you calculated in (e) into the equation for MSB to show your work. You will probably have to expand the equation a bit to do that. You can use R to double check your calculation. But we want to see that you can place the correct values into the equation. (5 points)
2. Calculate $MS\_{W}.$ Plug in the values you calculated in (e) into the equation for MSW to show your work. You will probably have to expand the equation a bit to do that. You can use R to double check your calculation. But we want to see that you can place the correct values into the equation. (5 points)
3. Plug the $MS\_{B}$ and $MS\_{W}$ into the *F* formula and report the result. (2 points)
4. Write the formulas for dfB and dfW. (2 points)
5. Calculate dfB and dfW. (2 points)
6. Find the critical *F*-value for α = .05 using the R command qf(). (1 point)
7. What is the *p-*value associated with your calculated ­*F-*ratio? I would suggest using the R command pf(). (1 point)
8. Based on this *p*-value, what is your statistical decision (in words)? (1 point)
9. Now run the same one-way ANOVA on R using the commands aov()and summary(). Take a screen shot of the ANOVA table and place it in your document. (2 points)