Module 11: Testing the hypothesis that something important happened
Psy 653 Research Methods

Part 1: Practice identifying minimum effects

1. A study that predicted differences in GPA from number of hours spent studying, and found a squared correlation of .103, which was significant, with F(1,230) = 3.26.
    a. Determine the critical *F* value for testing the hypothesis that GPA accounts for 1% of the variance in responses for the analysis that is highlighted
        i. This will require you to enter the appropriate values in Kevin's R script for the dfs, effect and execute the script

```
dfhyp= NA
dferr= NA
alpha=.05
effect= NA      #enter the minimum effect you are testing
sse=100         #Don't change this
mse=(((1/effect)-1)*sse)/dferr #Don't change this
noncen=sse/mse #Don't change this
qf((1-alpha),dfhyp,dferr,noncen) #Don't change this
```

b. Using Appendix B from Murphy, Myors & Wolach (2014), what can you say about the power of this study for rejecting

ii. The traditional null hypothesis
iii. The hypothesis that studying time accounts for at least 1% of the variance in responses

Part 2: Practice Bayesian analyses

We will use the following data for part 2 of this activity.

Description of the datasets for the demo activity:

"slpdata.csv"

A team of sleep researchers sought to study the effects of a 6-week sleep intervention aimed to improve participant's sleep hygiene. Sleep hygiene encompasses a variety of practices and habits that are necessary to have good nighttime sleep quality and full daytime alertness. The team formulated three different versions of the intervention. The first version (condition 1) provided participants with a self-help book on the topic of sleep hygiene. The second version (condition 2) brought participants together once per week in groups of 10-12 to teach the principles of sleep hygiene in a classroom setting. The final version (condition 3) also used the group-based classroom setting of condition 2, but in addition, each participant's partner was invited to also take part in the group sessions. Six-hundred male and female adults living with an intimate partner and suffering from a sleep disorder were recruited to take part in the study, the participants were randomly assigned to one of the three conditions. The data set includes the following variables:

- **sex:** 1=male, 2=female
- **age:** Participant's age in years
- **anxiety:** Participant's level of general anxiety measured at the start of the study via a multi-item scale. The scale (average of all items) ranges from 1 to 7, where a higher score indicates a higher level of anxiety.
- **prior:** An indicator of whether or not the participant had previously participated in some type of sleep intervention, 1 = yes, 0 = no.
- hygiene: Participant's sleep hygiene at week 6. It ranges from 0 to 10, and higher means better sleep practices.
- **support:** Participant's perception that their partner is supportive of their struggles with sleep and their efforts to improve sleep. It is a multi-item scale that ranges from 1 to 5, where higher indicates more support.
- **sleep:** Participant's average sleep efficiency during the month following the intervention, calculated as time spent in bed asleep (minus all the awakenings), divided by the total time spent in bed. It is expressed as a percentage.
- **lifesat:** Participant's sense of life satisfaction measured 30 days after the completion of the intervention. It is a multi-item scale that ranges from 1 to 7, where a higher score indicates more satisfaction.
- **cond:** Treatment condition, 1 = control, 2 = group-based intervention, 3 = group-based plus partner participation.

1. Create a new R notebook and load the following libraries: tidyverse, psych, and BayesFactor (Note: You will likely need to install the BayesFactor package)
2. Read in the datafile “slpdata.csv”.
3. Factor sex (1 = “male”, 2 = “female”) to a new variable called sex.f
4. Factor treatment condition (1 = “control”, 2 = “int”, 3 = “int + partner”) to a new variable called treatment.f.
5. Use an ANOVA to determine whether sex.f and cond.f are related to sleep.
    a. Calculate the effect size for each of your main effects and the interaction
    b. Interpret the model
6. Use the BayesFactor package to do a comparable analysis (Use the anovaBF function).
    a. First set whichModels = “all”
        i. Plot the models.
        ii. Interpret the models. Which model leads to the largest Bayes factor?
    b. Next, run the analysis again and set whichModels = “top”
        i. Plot the models
        ii. What does this set of analyses tell you?
    c. Lastly, run the analysis one more time and set whichModels = “bottom”
        i. Plot the models
        ii. What does this set of analyses tell you?
7. Interpret and compare the results from the regular ANOVA vs. the Bayes ANOVA. Do you come to similar conclusions?