Homework 1

For this homework, you'll be working with 3 sets of data (Data Sets A, B, and C) and one set of summary information (Data Set D). For my ease…please organize your HW by Data Set (For A show ANOVA, effect size, power, number of participants, etc., then the same for B, etc.)

1. Compute an ANOVA for Data Sets A, B, and D using a calculator.
2. Compute an ANOVA for Data Sets A, B, and C using SPSS.
3. Estimate the effect size (ω^2) for all 4 data sets using formulas and calculator.
4. Estimate the power ($1-\beta$) for all four data sets. [You need not use the computer, but you're likely better off using G•Power or SPSS to estimate power.]
5. Using the estimated effect size, determine the number of participants necessary to bring the studies described in each of the three problems to a power level of .80. [You need not use the computer, but you're likely better off using G•Power to estimate necessary sample size.]
6. Test the homogeneity of variance assumption for Data Sets A, B, and C using the Brown-Forsythe method. [Don't even think about doing this without a computer, but actually compute the Brown-Forsythe analysis, not just the SPSS Brown-Forsythe adjustment. Use SPSS to also compute the Levene test for homogeneity.]
7. For Data Set A, compute a restricted set of four comparisons that make sense to you (assuming that you did not know the results of the overall ANOVA). Evaluate the comparisons using both the Bonferroni and Sidák-Bonferroni procedures. Had these comparisons been planned, show how the analyses would have differed.
8. For Data Set B, determine a complete set of orthogonal comparisons. [No computer needed.] Then compute the orthogonal comparisons as though they were planned, providing the appropriate interpretation of the results. Compare the sum of the SS_{Comp} with the SS_A from the original ANOVA. [You could try to compute one of these without a computer, just to be sure that you understand the logic, but you'd probably be better off using Contrasts in SPSS.] Assess this restricted set of comparisons using both the Bonferroni and Sidák-Bonferroni procedures.
9. For each of the three problems, compute a set of simple post hoc comparisons using the Tukey's HSD and Fisher-Hayter procedures. [You could try to compute one of these without a computer, just to be sure that you understand the logic.]
10. Now, for the most important part. Interpret the results of each study as completely as you can. What would you conclude about the results of each study?

Data Set A. A psychologist was interested in the effects of different types of liquor on a mirror-drawing task. He administered five types of liquor (beer, wine, vodka, gin and scotch). Participants consumed one of the five types of liquor (that is, 6 Ss drank wine, 6 others drank beer, etc.). Each group then performed the mirror drawing task and the number of errors was recorded in the following table:

Wine	Scotch	Gin	Beer	Vodka
5	9	8	4	7
7	13	11	8	10
6	10	12	10	9
8	11	7	6	8
4	7	7	7	6
6	10	8	8	7

Data Set B. A psychologist would like to examine the relative effectiveness of three therapy techniques for treating mild phobias. A group of people who exhibit a moderate fear of spiders is obtained. Each individual is assigned to one of the three therapies (with $n = 5$). The DV is a measure of reported fear of spiders after the therapy, with larger numbers indicating greater fear. Does there appear to be an effect of type of therapy?

Therapy A	Therapy B	Therapy C
5	3	1
2	3	0
2	0	1
4	2	2
2	2	1

Data Set C. Betz and Thomas (1979) have reported a distinct connection between personality and health. They identified three personality types who differ in their susceptibility to serious, stress-related illness (heart attack, high blood pressure, etc.). The three personality types are alphas, who are cautious and steady; betas, who are carefree and outgoing; and gammas, who tend toward extremes of behavior such as being overly cautious or very careless. Sample data representing general health scores for each of these three groups are as follows. A low score indicates poorer health.

Alphas	Betas	Gammas
43	41	36
44	52	29
41	40	38
56	57	36
49	36	45
42	48	42
52	51	25
53	55	40
41	52	41
21	39	36

Data Set D. Suppose that for the study producing the data seen in Data Set B, you had the following summary statistics (assume n is unchanged):

	Therapy A	Therapy B	Therapy C
Mean	5	3	1
Standard Deviation	2	2	2