ASSIGNMENT 5 — Omnibus Tests II

For all questions below, provide all programming code and plots in the report. Unless stated otherwise, assume $\alpha = 0.05$

Mixed ANOVA

1. A biomedical engineer is interested in the role of the sound of a mother's heartbeat in the growth of newborn babies. Seven babies were randomly assigned to a condition in which they were exposed to a rhythmic heartbeat sound. The other seven babies did not hear a heartbeat sound. Infants were weighed at the same time of day for 4 consecutive days, yielding the following data (weight is measured in ounces): (11 marks).

	Heartbeat Group			
Subject	*Day 1*	*Day 2*	*Day 3*	*Day 4*
1	96	98	103	104
2	116	116	118	119
3	102	102	101	101
4	112	115	116	118
5	108	110	112	115
6	92	95	96	98
7	120	121	121	123
	Control Group			
1	112	111	111	109
2	95	96	98	99
3	114	112	110	109
4	99	100	99	98
5	124	125	127	126
6	100	98	95	94
7	106	107	106	107

a. Plot the data. (1 mark)

b. Report the GG-corrected p-value and F-statistics for the main effects and interaction. (2 mark)

c. Report the effect size η_p^2. (1 mark)

d. Is sphericity violated? (1 mark)

e. Is normality violated? (1 marks)

f. Perform follow up mean comparisons (two-tailed) (1 mark)

g. Perform a Holm-Bonferroni correction (1 mark)

h. Report the effect size for each followup mean comparison. (1 mark)

i. Interpret the findings. (1 mark)

j. How many participants should there be per group to obtain 80% power, with $\alpha = 0.05$, $f = 0.4$, and 1.0 sphericity? (1 mark)

ANCOVA

2. You have run a study to test the effectiveness of Viagra on Libido. There are three groups: Placebo (i.e., sugar pill), Low Dose of Viagra, and High Dose of Viagra. You have also considered the libido of each participant's partner as a covariate. Use the data below and perform an ANCOVA. 12 Marks.

Dose	Participant's Libido	Partner's Libido
Placebo	3	4
	2	1
	5	5
	2	1
	2	2
	2	2
	7	7
	2	4
	4	5
Low Dose	7	5
	5	3
	3	1
	4	2
	4	2
	7	6
	5	4
	4	2
High Dose	9	1
	2	3
	6	5
	3	4
	4	3
	4	3
	4	2
	6	0
	4	1
	6	3
	2	0
	8	1
	5	0

a. Plot the data. (1 mark)

b. Is there a significant main effect of group? (1 mark)

c. Report the effect size η_p^2 for the main effect of group. (1 mark)

d. Is there a linear relationship between the covariate and dependent variable? (1 mark)

e. Is homogeneity of the regression slopes violated? (1 mark)

f. Is normality of residuals (Shapiro Wilk test) violated? (1 mark)

g. Is normality between group variance (Levene's test) violated? (1 mark)

h. Perform follow up mean comparisons with the adjusted means. (1 mark)

i. Report the adjusted means. (1 mark)

j. Report the effect size (cohen's d) for each significant mean comparison. (1 mark)

k. Interpret the findings. (1 mark)

l. How many participants should there be for each of the three groups to obtain 80% power, with $m1.1 = 0.85$; $m2.1 = 2.5$, $m3.1 = 1.25$, $s1.1 = 1.7$, $s2.1 = 1$, $s3.1 = 1.2$, $\alpha = 0.05$, $r = 0.4$? (1 mark)