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Lab: 001B
HW#2

Question-1:
Q 9.10:
Answer:
In the Bonferroni procedure the level of error rate becomes smaller with the increase in number of treatment groups. A smaller error rate makes the procedure more conservative in this sense but the chances of making Type II errors increases. Therefore, even though Bonferroni is conservative, the power of Bonferroni is comparatively low.

Q 9.13:
Answer:
For this problem we label the mean overweight measurements for agents A1, A2, A3, A4, and S respectively as mu_1, mu_2, mu_3, mu_4, mu_5. We want to test if any of these means are statistically different.

Hypotheses for parameter of interest
NULL Hypothesis, H_0 = mu_1 = mu_2 = mu_3 = mu_4 = mu_5
Alt. Hypothesis, H_A = at least one of mu_1 , mu_4, mu_3, mu_4, mu_5 is different

Assumptions made on the model:
i. single, continuous response variable obtained
from a simple random sample, OR, a completely
randomized design is used
ii. Within each treatment group the residuals are
homoscedastic, independent, and normally distributed

The test statistic is: 15.68

The p-value: 0.0001

Conclusion: As p-value < 0.05 we reject the null hypothesis. We state that there is any statistically significant evidence to suggest that at least one of the mean overweight measurements for the five agents is different.

Q 9.14b:
Answer
The statistically significant different pairs of means are
-Agents A4 and S
-Agents A1 and S
-Agents A2 and S
-Agents A4 and A3
-Agents A1 and A3

Question-2:

Q9.17
Answer
a. $\mu_s - 1/4 *(\mu_1 + \mu_2 + \mu_3 + \mu_4)$
b. $1/2 *(\mu_1+\mu_3) - 1/2 * (\mu_2 + \mu_4)$
c. $1/2 *(\mu_1+\mu_2) - 1/2 * (\mu_3 + \mu_4)$
d. $1/2 *(\mu_1+\mu_3) - \mu_s$

Q9.18
Answer
t = 5
α_E = 0.05, $\alpha_I = \alpha_E$/t-1 = 0.05/4 = 0.0125
N = total observations = 50 , N –t =45
T $\alpha_{I/2}$, N – t = 2.86898
a.
MOE = 6.74416
95% confidence interval for the contrast = (9.27-11.395) ± 6.74416 = (-8.8694, 4.61916)
The interval contains zero.
Decision: We are 95% confident that a statistically significant difference does not exist between the mean of the standard to the average of the four agent means

b.
MOE = 6.0321
95% confidence interval for the contrast = (11.16-11.63) ± 6.0321 = (-6.5021, 5.5621)
The interval contains zero.
Decision: We are 95% confident that a statistically significant difference does not exist between the mean for the agents with counseling to those without counseling

c.
MOE = 6.0321
95% confidence interval for the contrast = (11.535-11.255) ± 6.0321 = (-5.7521, 6.3121)
The interval contains zero.
Decision: We are 95% confident that a statistically significant difference does not exist between the mean for the agents with exercise to those without exercise

d.
MOE = 7.3878
95% confidence interval for the contrast = (11.16-9.27) ± 7.3878 = (-5.4978, 9.2778)
The interval contains zero.
Decision: We are 95% confident that a statistically significant difference does not exist between the mean for the agents with counseling to standard