Stat 243 – Homework 05

Richmond Yevudza

March 31, 2022

8.1

It can be seen that variation of the values in group 1 and group 2 in a dataset A is large than dataset B. So the difference in the group of dataset is uncertain. But there is very less variation in dataset B. So, it is certain that groups are from a dissimilar population. Hence, the sample data B has a stronger evidence of a difference in the two population means.

8.8

Four groups with $n_1 = 10$, $n_2 = 10$, $n_3 = 10$, and $n_4 = 10$. ANOVA table is as follows:

Source	df	SS	MS	F-statistic
Groups	3	960	320	2
Error	36	5760	160	
Total	39	6720		

8.10

Three groups with $n_1 = 5$, $n_2 = 8$, $n_3 = 7$, and $n_4 = 5$. ANOVA table is as follows:

Source	df	SS	MS	F-statistic
Groups	3	600	200	5.25
Error	21	800	38.0952	
Total	24	1400		

8.12a

5

8.12b

NULL = means of all groups are equal

ALTERNATIVE = means of at least two groups are different

8.12c

0.0012

8.12d

we reject H_0 due to p-value being less than level of significance, so there's enough evidence to conclude at least two group means are different

8.14a

4

8.14b

NULL = means of all groups are equal

ALTERNATIVE = means of at least two groups are different

8.14c

0.538

8.14d

we fail to reject H_0 due to p-value being greater than level of significance, so there's not enough evidence to conclude at least two group means are different

8.16a

People perform differently on achievement tasks based on exposure to different colors.

8.16b

Source	df	SS	MS	F-statistic
Groups	2	27.7	13.85	16.49
Error	68	57	0.84	
Total	70	84.70		

8.16c

0

8.16d

There is evidence showing that color affects achievement performance, as the p-value was lower than the level of significance.

8.24a

bright light

8.24b

Yes

8.24c

Yes

8.24d

The variables are LL, LD, DM, and BM gain

LL, LD, and LL are all categorical

BM gain is a quantitative variable

8.25a

H_0 = amount of light at night doesn't affect weight gain

H_1 = amount of light at night has some affect on weight gain

8.25b

F: 8.38 P: 0.0002 Conclusion: reject null hypothesis H_0 due to p-value being lower than level of significance

8.25c

Yes - the higher the light level, the more weight the mice gained. LL had the highest weight gain as a result.

8.25d

Yes, since these are results from a randomized experiment.

8.26

H_0 = activity level mean insignificant

H_a = activity level mean significant

F: 0.09 P: 0.910

Conclusion: P greater than 0.1, so accept H_0, therefore there's no significant difference in activity level.

8.27a

Nope, standard deviations are too different

8.27b

Don't reject H_0.

8.31

Conditions for ANOVA make sense

F = 27.86

P = 0.000

Reject H_0

8.46a

No difference

8.46b

No difference

8.46c

There is a difference; the null hypothesis is being rejected

8.52

Anova SF				
Groups	Count	Sum	Average	Variance
Low	30	2055	68.5	263.569
Medium	30	1760	58.6667	204.023
High	30	1745	58.1667	189.7989
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ANOVA

Anova SF				
————————	—-	—-	———-	———-
Source of Variation	SS	df	MS	F
Between Groups	30	2	1018.611	4.648427
Within Groups	30	87	219.1303	
Total	30	89		

since p-value is greater than 0.05, means are in fact significant

significance level: 0.05 number of treatments: 3 DF error: 87 MSE: 219.130 q-stat value: 3.4000

Anova SF				
pop mean diff	crit val	lower limit	upper limit	result
mu1-mu2	9.83	9.19	0.64	19.02
mu1-mu3	9.83	9.19	0.64	19.02
mu2-mu3	0.00	9.19	-9.19	9.19