MTH 324, Quiz #7, Fall 2023 Name KEY

Instructions: Answer each question as thoroughly as possible. Round answers to 4 decimal places as needed. Exact answers are best when possible. Be sure to answer all parts of each question.

	A	B	C
2			
3	Flavor 1	Flavor 2	Flavor 3
4	13	12	7
5	17	8	19
6	19	6	15
7	11	16	14
8	20	12	10
9	15	14	16
10	18	10	18
11	9	18	11
12	12	4	14
13	16	11	11

1. A marketing company tests three new flavors on a sample of volunteers and asks them to score the flavor of candy they are given on several aspects that total to 20 points. The results for all subjects appear in the table below. Conduct a one-way ANOVA test to see if there are differences in total ratings among the flavors. If you detect a difference, use Tukey's method to determine how to group the effects. Clearly state your hypothesis, check your normality assumptions and state your conclusion in the context of the problem. [Hint: you will need to convert the data into two columns, one with the number of the flavor, and one with the rating.]

$H_0: \mu_i = \mu_j \ \forall i \neq j$ $H_a: \mu_i \neq \mu_j$ for some $i \neq j$

$F = 2.51$ $p = 0.099\ldots$

fail to reject null

the means are equal (approx)

		Water temperature		
	Detergent	Cold	Warm	Hot
A	Detergent x	4	7	10
		5	8	11
		5	9	12
		6	12	19
		5	3	15
	Detergent y	4	12	10
		4	12	12
		6	13	13
		6	15	13
		5	13	12

B

2. Suppose we want to explore how a detergent and a particular water temperature affect the dirt removal of laundry. We also want to check if the combined effect of detergent and water temperature can affect the dirt removal and the results are shown in the table. Conduct a two-way ANOVA test to see if there are effects to the medication and dosage level. If you detect a difference, use Tukey's method to determine how to group the effects. Clearly state your hypothesis, check your normality assumptions and state your conclusion in the context of the problem. Be sure to test for interaction effects. [Hint: You will need to reorganize the data into three columns: one for the detergent, one for the water temp and one for the measure of dirt removal.]

A: $H_0: \mu_i = \mu_j \ \forall i \neq j$, $H_a: \mu_i \neq \mu_j$ for some $i \neq j$ p-value 1.33×10^{-7}

B: $H_0: \mu_i = \mu_j \ \forall i \neq j$, $H_a: \mu_i \neq \mu_j$ for some $i \neq j$ p-value 0.12455 ← fail to reject

AB: $H_0: \mu_i = \mu_j \ \forall i \neq j$, $H_a: \mu_i \neq \mu_j$ for some $i \neq j$ p-value 0.00606

removing interaction does not improve p-value for B

$Y_{\text{dirt removal}} = \alpha_i + \beta_j + \gamma_{ij}$

↑ include or not?

Water - warm-hot overlaps w/0
warm-cold, hot-cold do not

Detergent - overlaps w/0

interactions 8 do not, 7 do