Assignment 10, MECO 6315

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Source	SS	df	MS	F	$Prob > F$
Columns(b)	867.53	4	216.88	3.70	0.01
Error(w)	2928.91	50	58.58		
Total	3796.44	54			

Table 1: One way ANOVA, independence assumption

1 Question 1

I used one way Anova for the first part, which made assumption of independance. As the p-value is significant w.r.t. 95% confidence interval, we can reject null hypothesis that nothing is going on. The code of MATLAB is attached.

2 Question 2

Repeated measure ANOVA is shown in the following table. Two way ANOVA gave me $p - val(b) < .05$ indicating that null hypothesis of no difference among word positions could be rejected.

3 Question 3

Result Bonferroni paired ttest is shown in the following table. As could be seen in table 3, null hypothesis of same mean for first and second, first and fourth, second and third, and third and fourth could be rejected.

Positions	$p - value$
x_1, x_2	0
x_1, x_3	0.3386
x_1, x_4	0.0001
x_1, x_5	0.0131
x_2, x_3	0.0002
x_2, x_4	0.4079
x_2, x_5	0.0162
x_3, x_4	0.002
x_3, x_5	0.1112
x_4, x_5	0.1021

Table 3: Bonferroni method ten paired t-test

4 Question 4

Result of multivariate analysis based on given formula and contrast vector is shown in table 4. Lower bound and higher bound is calculated, only between first and second position we have significant difference.

To select the method out of four we have the following:

1. First method is not reliable, since we know we have repeated measurement, mean with common factor.
2. Second method assumes no covariance, which we do not know anything about.
3. Fourth method assumes common covariance matrix, yet that may not also be credible.

Probably now that we do not have any information it is better to stick to the conservative approach of using Bonferroni method. The middle approach

Source	SS	df	MS	F	$Prob > F$
Columns (b)	867.53	4	216.882	9.25	$2.18E-05$
Rows	1990.84	10	199.084	8.49	$3.21E-07$
Error(w)	938.07	40	23.452		
Total	3796.44	54			

Table 2: Repeated Measure ANOVA

Positions	Low B.	High B.
x_1, x_2	0.855	20.2360
x_1, x_3	-6.093	10.0930
x_1, x_4	-1.969	19.6053
x_1, x_5	-7.090	17.8169
x_2, x_3	-18.773	1.6824
x_2, x_4	-9.499	6.0444
x_2, x_5	-15.272	4.9081
x_3, x_4	-3.398	17.0346
x_3, x_5	-5.494	12.2212
x_4, x_5	-14.565	7.6560

Table 4: Multivariate analysis

could be using Bonferroni Holm method.