Practice Problems

Problem 10.3:

The data in the table below resulted from an experiment that utilized a completely randomized design.

Treatment 1	Treatment 2	Treatment 3
3.9	5.4	1.3
1.4	2.0	.7
4.1	4.8	2.2
5.5	3.8	
2.3	3.5	

(a) Complete the following ANOVA table.

General Linear Models Procedure
Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	(1)	(4)	(5)	(7)	.07528
Error	(2)	18.332000	(6)		
Corrected Total	(3)	30.752308			

(b) Test the null hypothesis that $\mu_1 = \mu_2 = \mu_3$, against the alternative that at least two of the means differ. Use $\alpha = 0.10$.

Problem 10.4:

The tensile strength of portland cement is being studied. Four different mixing techniques can be used economically. The following data have been collected.

Mixing Technique	Tensile Strength ($lb/in.^2$)			
1	3129	3000	2865	2890
2	3200	3300	2975	3150
3	2800	2900	2985	3050
4	2600	2700	2600	2765

(a) Complete the following ANOVA table.

General Linear Models Procedure
Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	(1)	(4)	163246.73	(7)	.00049
Error	(2)	(5)	12825.69		
Corrected Total	(3)	(6)			

(b) Test the null hypothesis that $\mu_1 = \mu_2 = \mu_3 = \mu_4$, against the alternative that at least two of the means differ. Use $\alpha = 0.05$.

Problem 10.5:

An experiment was run to determine whether four specific firing temperatures affect the density of a certain type of brick. The experiment led to the following data.

Temperature	Density				
100	21.8	21.9	21.7	21.6	21.7
125	21.7	21.4	21.5	21.4	
150	21.9	21.8	21.8	21.6	21.5
175	21.9	21.7	21.8	21.4	

(a) Complete the following ANOVA table.

General Linear Models Procedure
Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	(1)	0.1561111	(5)	(7)	.15687
Error	(2)	(4)	(6)		
Corrected Total	(3)	0.5161111			

(b) Does the firing temperature affect the density of the bricks? Use $\alpha = 0.05$.