

ANOVA Homework

Name _____

- 1) An experiment to determine the effect of several methods of preparation for use in commercial yogurt was conducted by a food science research group. Three batches of yogurt were prepared using each of three methods: traditional, ultra filtration, and reverse osmosis. A trained expert then tasted each of the 9 samples, presented in random order, and judged them on a scale from 1 to 10. Complete the following ANOVA table:

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F-Ratio	Prob > F
PREP		17.30			
Error		0.460			
Total		17.769			

- 2) A researcher wishes to try three different techniques to lower blood pressure of individuals diagnosed with high blood pressure. The subjects are randomly assigned to three groups; the first group takes medication, the second group exercises, and the third group follows a special diet. After four weeks, the reduction in each person's blood pressure is recorded. The data are shown below.

	Medication	Exercise	Diet
	10	6	5
	12	8	9
	9	3	12
	15	0	8
	13	2	4

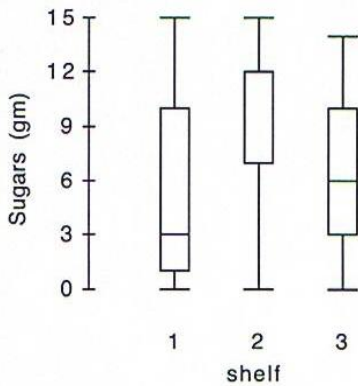
(a) State the hypotheses.

- (b) Assume the assumptions for inference are satisfied. Run ANOVA on your calculator and copy the results into the table below.

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F-Ratio	Prob > F
Factor					
Error					
Total					

(c) State your conclusion using a 5% significance level.

- 3) Cereal manufacturers often place similar types of cereal on the same supermarket shelf. The sugar content and the shelf were recorded for 77 cereals. Does sugar content vary by shelf?



Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F-Ratio	Prob > F
SHELF	2	248.4079	124.204	7.3345	0.0012
Error	74	1253.1246	16.934		
Total	76	1501.5325			

Level	Number	Mean	Std Dev
1	20	4.80000	4.57223
2	21	9.61905	4.12888
3	36	6.52778	3.83582

Assume the assumptions for inference are satisfied. The P-value of 0.0012 provides evidence that the mean sugar content is not the same on all three shelves. *But which ones are significantly different?* Use the Scheffe Test to determine where the difference is.

- (a) Use an F-table to find the critical value (C.V.), and then find F' .

$$F' = DF_{\text{SHELF}} \times (\text{C.V.}) =$$

- (b) For \bar{X}_1 versus \bar{X}_2 :

$$F_s = \frac{(\bar{X}_1 - \bar{X}_2)^2}{MS_E \times \left(\frac{1}{n_1} + \frac{1}{n_2} \right)} =$$

- (c) For \bar{X}_2 versus \bar{X}_3 :

$$F_s = \frac{(\bar{X}_2 - \bar{X}_3)^2}{MS_E \times \left(\frac{1}{n_2} + \frac{1}{n_3} \right)} =$$

- (d) For \bar{X}_1 versus \bar{X}_3 :

$$F_s = \frac{(\bar{X}_1 - \bar{X}_3)^2}{MS_E \times \left(\frac{1}{n_1} + \frac{1}{n_3} \right)} =$$

- (e) What can you conclude?