

STAT 516 - Spring 2001 - Homework 4

Due: Friday, March 9th by noon [previously 3/7/01]

1) (2 points) Indicate whether each of the following is true or false. If false, correct it so that it is a true statement.

a) One of the assumptions for using the (pooled) two-sample t-test is that the samples come from populations having equal means.

b) Consider the problem of testing if the means of two groups are equal by using both the two-sample t-test and one-way ANOVA. If the conclusions from these two tests disagree, you should trust the results of the t-test.

c) In a one-way ANOVA, you are more likely to reject the null hypothesis that the means are equal if the s^2_{wit} is small.

d) If the value of every observation is multiplied by 2, then the value of the F statistic in an ANOVA table is multiplied by 4.

2) (4 points) A 1992 study in the *College Student Journal* compared the GPAs of traditional and nontraditional (>25 years old) college students. The summary information for the two groups is as follows:

	Traditional	Nontraditional
n	94	73
mean	2.90	3.50
s.d.	0.50	0.50

Answer the following, doing all calculations by hand, and showing all of your work.

a) Perform a two-sample t-test (at $\alpha=0.05$) for testing that the mean GPA for traditional and nontraditional students are equal, against the alternate hypothesis that they differ. What assumptions must you make for this test to be valid?

b) Construct the ANOVA table for testing the null hypothesis that the mean GPAs for traditional and nontraditional students are equal, against the alternate hypothesis that they differ. Why is the assumption that the mean of the errors is zero always met for one-way ANOVAs?

3) (4 points) The data set on the web concerns the growth of bacteria on steak using four types of packaging conditions: commercial plastic wrap, vacuum packaged, a mixture of gases (1% CO, 40% O₂, 59% N), and 100% CO₂.

a) Perform the one-way ANOVA to test that there is an effect due to packaging condition. Check the assumptions (including using Levene's test).

b) Use the Holm test with a family-wise α -level of 0.05 to test all of the pair-wise differences.

c) Use a contrast to make a 95% confidence interval for the difference between the packaging methods involving a vacuum and the average of those involving a particular mixture of gasses.