STA 572 Practice Problems 2

1. When conducting a hypothesis test for a population mean vector equal to a vector of constants, what sample information is used that is not taken into consideration when conducting hypothesis tests for the individual components of the mean vector?

2. List the advantages and disadvantages of constructing a confidence region instead of conducting a hypothesis test for a population mean vector. Which inferential method do you prefer and why?

3. Give a reason why the chi-squared distribution is used to approximate the distribution (under the null) of the test statistic T^2 when sample size is large.

4. List the assumptions associated with the paired comparison of two treatment mean vectors.

5. How do you know when to "pool or not to pool" when conducting inferences on the difference between two population mean vectors?

6. Consider a one-way MANOVA involving g groups.
a. State the null and alternative hypotheses in terms of the population mean vectors.
b. State the null and alternative hypotheses in terms of the group effect vectors.
c. Suppose the null hypothesis (in part **a.** or **b.** above) is rejected. What additional analyses would you consider?
d. Suppose the null hypothesis (in part **a.** or **b.** above) is not rejected. What additional analyses would you consider?

7. Consider the case where $p \geq 1$ and $g = 2$. To conduct the hypothesis test involving $H_o : \underset{\sim}{\mu}_1 = \underset{\sim}{\mu}_2$, Hotelling's T^2 test statistic was developed. Show that Hotelling's T^2 and Wilks' Λ^* test statistics for this MANOVA problem are related as follows:

$$T^2 \overset{d}{=} (n_1 + n_2 - 2)\frac{1 - \Lambda^*}{\Lambda^*}.$$

In other words, T^2 and $(n_1 + n_2 - 2)(1 - \Lambda^*)/\Lambda^*$ have the same distribution under H_o.

8. In a two-way MANOVA, why does one test for significant interaction effects prior to considering the tests for significant main effects?