MTH 316 Practice Problems 2

1. When considering the equality of two population means, please explain the difference between the WMW test and the permutation test.

2. When considering the equality of two population means using a t-test, why is it important to check for normality and the equality of population variances? Please explain.

3. a. What assumptions must hold true in order to trust the conclusions reached using an F-test for the equality of k population means?
b. Which nonparametric method, the Wilcoxon rank-based test or the Kruskal-Wallis test, should be used to test the equality of k population central values? Please explain.

4. Please explain how blocking is an extension of paired sampling.

5. Consider a regression model having only one predictor variable that takes on the values 0 or 1. Is the test $H_o : \beta = 0$ versus $H_1 : \beta \neq 0$ using normal theory the same as the two-sample t-test for the equality of two populations means assuming equal but unknown population variances? Please explain.

6. How does Pearson's correlation coefficient differ from Lin's concordance correlation coefficient? Please explain.

7. a. In a simple linear regression model where $(x_i, y_i), i = 1, ..., n$, is used to find the fitted model, explain and interpret the meaning of $\widehat{\alpha}$, $\widehat{\beta}$, and $\widehat{\sigma}$.
b. Give an example of a full model and a reduced model in the context of simple linear regression.

8. In a 2×2 contingency table for two categorical variables, show that $p_1 = p_2$ is equivalent to $\theta = 1$.

9. Explain how bootstrapping can be used as a (i) nonparametric method or as a (ii) parametric method to construct confidence intervals.