STA 575 Practice Problems 3

1. This question refers to material in Chapter 13.
a. Explain how to implement a two-stage sampling design.
b. Under what conditions is the "additional" variance of the estimator due to the second stage small?
c. Must one conduct a simple random sample at each stage of a multistage sampling design? Explain.
d. Give an example where a two-stage sampling design (as opposed to a one-stage) must be performed in order to estimate τ.

2. This question refers to material in Chapter 16.
a. If p = probability of detection, explain why

$$Var(\widehat{\tau}) \;=\; N^2\left[\left(\frac{N-n}{N}\right)\frac{\sigma^2}{n}+\left(\frac{1-p}{p}\right)\frac{\mu}{n}\right]$$

using simple random sampling without replacement.
b. Give an example where detectability issues are of no concern.
c. Give an example where it is important to consider detectability issues.

3. This question refers to material in Chapter 17.
a. Comment on the advantages and disadvantages of using the parametric method to estimate the density (D).
b. Comment on the advantages and disadvantages of using the kernel method to estimate the density (D).

4. This question refers to material in Chapter 18.
a. Provide an example in which the estimates of τ using Peterson's method and Chapman's method are vastly different.
b. Using part **a.**, construct confidence intervals for τ using the two methods and comment on your findings.