Name: _____ Section: Mon / Wed

FOR 373: Assignment 6 –Cluster and Double Sampling [60 points]

Notes: 2-pages of notes can be attached to this assignment and you are encouraged to use your calculator or Excel where necessary. You must show your work to receive any credit (e.g., the equation you use and any assumptions you make). Doing so also indicates whether you understand the method and help you receive partial credit, even if your final answer is incorrect.

1. When do we use cluster sampling and what are its potential benefits?

2. How is cluster sampling different from stratified sampling (what are we looking for in the group relationship)?

3. If you perform a cluster sample with 4 plots in each cluster and 25 total clusters, what would be your 'n' value for the statistics?

4. How can you increase the variability within a cluster?

5. When using regression estimation, what conditions need to be met?

6. Give three scenarios that we could use double sampling to improve our estimation of population parameters.

7. Write and define the individual terms of the finite population term. Describe why we use it.

8. What are the three requirements of a sample?

9. You are taking over management of a plantation and have been asked to estimate the average height of trees in the plantation. The plantation has been divided into 400 row-segments, each containing an equal number of original planting spaces (but not an equal number of surviving trees due to differential mortality rates). A simple random sample of 20 row-segments is selected from the 400 segments that compose the plantation. All trees in the sampling segment are measured; estimate the number of trees in the plantation, average height of trees in the plantation and its standard error.

10. Your organization established a grid of permanent plots throughout its 600 acre forest empire. The plots were laid out in clusters of 4 plots. At the time of establishment management decided to install one cluster for each 40 acres. The plots were 0.25 acres in size, each established on a cardinal direction. Plots along the N-S line E-W line were 4 chains apart. The objective of establishing these clusters was the estimation of periodic growth to be used in forest wide planning. The 10 year periodic cu ft growth for each plot in each cluster is shown below. Estimate the forest wide growth and its standard error per acre.

11. You have a 60 acre stand of timber that you placed 25 1/10 acre plots on with the following characteristics:

Average volumes: 420 cu ft of PIPO/acre; 380 cu ft of PSME/acre; 210 cu ft of THPL/acre
Standard deviations: 30 cu ft of PIPO/acre; 25 cu ft of PSME/acre; 40 cu ft of THPL/acre
Species value: $280 mbf for PIPO; $320 mbf for PSME; $410 mbf for THPL
With 90% certainty what is the maximum amount you could sell the stand for?

12. Using the attached dataset of a stand level cruise performed using the BigBAF sampling approach, were a 20 BAF was used for count trees and a 70 BAF was used to identify measure trees, calculate stand level volume per acre. Use the Gholz *et al.* (1979) equations for Total Stem biomass (ST) or stem wood (SW) found in Ter-Mikaelian and Korzukhin (1997) to obtain stem volume allometric relationships for the estimation of VBAR. Assume the stand is 64 acres and use the following densities for calculating cu ft volume; DF = 27.84 lb/cu ft; PP = 26.76 lb/cu ft; LP = 27.22 lb/cu ft.

Extra Credit: For question #12 calculate the standard error (%) for volume per acre and then calculate a 95% confidence interval for stand level volume. [5 points]