STA304/1003 H1F - Summer 2014:
Surveys, Sampling, and Observational Data

Supplementary Exercises # 5

1. Make up an original example of one-stage cluster sampling. Give two reasons why it is not stratified sampling. Modify your example to make it a two-stage cluster sample.

2. A population of K individuals is partitioned into N groups with M_i individuals in each group. Show that:

$$SSTO = SSTR + SSE \ ;$$

where $SSTO = (K-1)S^2$, $SSTR = \sum_{i=1}^{N} M_i^2(\bar{y}_{iU} - \bar{y}_U)^2$, and $SSE = \sum_{i=1}^{N}(M_i - 1)S_i^2$.

Use this result to determine when cluster sampling should be used and when stratified sampling should be used.

3. A population is partitioned into two groups: $G_1 = \{4, 5, 8\}$ and $G_2 = \{2, 6, 8\}$.

(a) Find the mean and variance of each group.

(b) Find the variance of the group means.

(c) Find ICC.

(d) Is this partition more suitable for cluster sampling or stratified sampling? Justify.