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Statistics Department

Assignment – No. – 02 ***Paper – STA – 303***

1. Describe method of stratified random sampling.
2. Mention advantages of stratified random sampling. Also, state different allocations used in stratified random sampling.
3. When total cost C, where C = $a + \sum_{i=1}^{L} c_i n_i$, is given as Co, then find the optimum stratum sample size n_i which minimizes variance of stratified mean $V\left(\bar{y}_{st}\right)$.
4. In Usual notations prove that (i) $E(\overline{y_{st}})=\bar{Y}$ (ii) $V(\overline{y_{st}})=\frac{1}{N^2}\sum_{i=1}^{L} N_i (N_i - n_i)\frac{S_i^2}{n_i}$.
5. Define systematic sampling. Discuss its advantages.
6. In usual notations, prove that if N = nk,

$$E(\overline{y_{sy}})=\bar{Y} \qquad V(\overline{y_{sy}})=\frac{1}{k}\sum_{h=1}^{k}\left(\bar{y}_{io.} - \bar{Y}\right)^2$$

7. For systematic sampling, in usual notations, prove

$$V\left(\overline{y_{sy}}\right) = \frac{N-1}{N} S^2 - \frac{N-k}{N} S^2_{wsy}$$

8. In usual notations, for systematic sampling, prove following

$$V\left(\overline{y_{sy}}\right) = \frac{N-1}{N} \frac{S^2}{n} \left\{1 + (n-1)\rho\right\}.$$

10. Discuss two stage sampling scheme giving real life example.
11. Describe two stage sampling in detail.
12. In usual notation for two stage sampling show that

$$V\left(\bar{\bar{y}}\right) = \left(1 - f_1\right)\frac{S_1^2}{n} + \left(1 - f_2\right)\frac{S_2^2}{mn}.$$

13. In systematic sampling, if $\bar{y} = \overline{y_{mn}}$, then estimate the population mean.
14. Expalain proportional and Neyman allocations.
15. State the formula to find gain due to stratification as compred to simple random sampling.
16. "Stratification is required when population is homogeneous". Is it true? If not, correct the statement.