

**Sampling techniques (78143)**

3.3.2009

**Intermediate studies (6 cp)**

Please make your choice for 4 items out of the 5 items for completion.

1. Define concepts

- a) Frame population.
- b) Design weight.
- c) Design effect, deff.

2. Systematic sampling

- a) Explain the phases and procedure for systematic sampling of  $n$  elements from a population of  $N$  elements.
- b) Explain implicit stratification in systematic sampling. When one can expect benefits from implicit stratification? What kind of benefits?

3. Stratified sampling

- a) Explain the phases and procedure for element-level stratified sampling of  $n$  elements from a population of  $N$  elements.
- b) Explain the technique of proportional allocation in element-level stratified sampling.
- c) Explain the technique of equal allocation in element-level stratified sampling.

4. PPS sampling

- a) Explain the procedure of with-replacement type PPS sampling based on cumulative sums.
- b) What auxiliary data are needed for PPS sampling?
- c) Formulate conditions under which PPS sampling is more effective than simple random sampling without replacement (SRSWOR).

5. Model assisted estimation

- a) Explain the method of regression estimation in the estimation of population total.
- b) The variance estimator of regression estimator  $\hat{t}_{reg}$  under SRSWOR can be written as

$\hat{v}_{SRS}(\hat{t}_{reg}) = N^2(1 - \frac{n}{N})(\frac{1}{n})\hat{s}_y^2(1 - \hat{\rho}_{yz}^2)$ . Based on the formula, conclude when regression estimation is more effective than SRSWOR.