

### Seminar 3

1. Random Sampling is best defined as a method of sampling:
  - a) that chooses items in such a way that each item and each group of  $n$  items is equally likely to be chosen or included in the sample.
  - b) that chooses items in a systematic way that necessarily included some items and does not include other items.
  - c) that sorts items into clusters and then samples from these clusters in a random way.
  - d) that sorts items into strata and then samples from these strata in a way representative of the population.
  
2. List the advantages of sampling over census.
  
3. Farlington Bank is considering a merger with Sentry Bank, but needs shareholder approval before the merger can be accomplished. At its annual meeting, to which all shareholders are invited, the president of Farlington Bank asks the shareholders whether they approve of the deal. Eighty-five percent approve. Is this percentage a sample statistics or a population parameter ?
  
4. A non-profit organisation is conducting a door-to-door opinion poll on municipal day-care centres. The organisation has devised a scheme for random sampling of houses, and plans to conduct the poll on weekdays (Mon – Fri) from noon to 5 p.m. Will this scheme produce a random sample?
  
5. Bob Peterson, public relations manager for Power and Light, has implemented an institutional advertising campaign to promote energy consciousness among its customers. Peterson, wants to know if the campaign has been effective, plans to conduct a telephone survey of area residents. He plans to look in the telephone book and select random numbers with addresses that correspond to the company's service area. Will Peterson's sample be a random one?  
*\* Hint: when people apply for a telephone line, they can choose to have or not to have their telephone number listed in the phone book.*
  
6. The manager in charge of customer services of Turbo Wash Co. Ltd. is planning to conduct a survey to determine whether customers who purchased a washing machine from his/her company over the past six months were satisfied with the product. Using the warranty cards submitted by the customers after the purchase over the past six months, the manager made up a list of relevant customers and 220 of them were randomly selected. A questionnaire designed to assess customers' satisfaction with the washing machine was then mailed to each of them.
  - a) Describe the population and sample of the survey set up by the manager.
  - b) Describe the inference of interest in this survey.
  - c) Did the list made up by the manager cover the whole actual population of interest ? Explain.

**Seminar 3 (cont.)**

7. Suppose that the BA Departmental Committee want to select six student representatives, from the current 138 BA first year students, to join the departmental committee.
- a) Using the random number table provided to generate the random number, describe the method and procedure for selecting the sample by Simple Random Sampling. And identify the six students to be included in the committee if you begin at row 5 of the table and read across the row.
  - b) Describe how you would select a Systematic Random Sample. Identify the six students to be included in the committee, if you begin at row 5 of the random number table and read across the row.

**Seminar 3 (Suggested Solution)**

1. (a)
2. Sampling is less costly, less time consuming, more convenient, and more efficient than complete enumeration in determining something about a population in general.
3. It is probably both. It is a parameter for the population of shareholders attending the meeting. However, unless all shareholders were at the meeting, it is only a sample statistic for the population of all shareholders.
4. No. Between noon and 5 p.m. on a weekday, no one will be at home if both parents work, and their children are of pre-school age. Thus the heaviest users of daycare centres are excluded from a pool on daycare canthers.
5. Very possible not. The population that Peterson is interested in is all of Piedmont's customers. The intersection of the set of customers and the set of persons with telephones may be large enough for Peterson to make inferences, but quite probably it is not. Peterson's poll might (1) include home without electricity and (2) definitely does not include customers who do not have phones. If a large percentage of the population of the service area does not have telephone service, it would be very dangerous for Peterson to infer too much from his sample. The sample is probably not at random.
- 6 a. All the "registered" purchasers of the washing machine in the 6-month period is the population.  
Those 220 randomly selected purchasers in the sample.
- b. Consumer's satisfaction of their washing machines is the inference of interest in this survey.
- c. No.  
This is because some purchasers of washing machine may not submit their warranty cards.

- 7 a. Since we have 138 students, we choose a three-digit number from the random number table to represent the students.

Say 001 for 1<sup>st</sup> student, 002 for 2<sup>nd</sup> student, ..., and 138 for 138<sup>th</sup> student. and for the numbers 000, and from 139 to 200 are discarded. And then for numbers 201, 202, ..., 338 are representing the 138 students again, and discard numbers from 339 to 400, and so on.

Begin from row 5 of the table and read across, the 3-digits random numbers are 615, 450, 083, 593, 251, 872, 033 and so on.

the first number 615 representing the  $(615 - 200 \times 3 = )$  15<sup>th</sup> student.  
(first selected student)

the second number 450 representing the  $(450 - 200 \times 2 = )$  50<sup>th</sup> student.  
(second selected student)

the third number 083 is representing 83<sup>th</sup> student  
(third selected student)

the fourth number 593 is representing  $(593 - 200 \times 2 = )$  193<sup>th</sup> student, **discarded**

the fifth number 251 is representing  $(251 - 200 \times 1 = )$  51<sup>th</sup> student  
(fourth selected student)

the sixth number 872 is representing  $(872 - 200 \times 4 = )$  72<sup>th</sup> student  
(fifth selected student)

the seventh number 033 is representing 33<sup>th</sup> student  
(sixth selected student)

So, the six selected students are number 15, 50, 83, 51, 72 and 33.

***(Remark: All other relevant answer is acceptable)***

- 7 b. As  $N/n = 138/6 = 23$ , so we have to select every 23rd student. And choose 2-digits random number between 01 to 23. Begin at row 5 of the table and read across, we get 61, 54, 50 are discarded, then **08**. Suppose the 138 students are numbered from no. 001 to no. 138, then the first student selected is no. 08. and the six students selected are number 08, 31, 54, 77, 100, and 123

***(Remark: All other relevant answer is acceptable)***