1. Jerald is a counting agent for a particular constituency in the General Elections of a country, a sample count is done to give an indication of the result while the actual counting is happening. Jerald is in charge of a polling station, where multiple ballot boxes are used. He is instructed to pick out the first 100 votes cast into every ballot box. Which of the following best describes the sampling plan?

A. Simple Random Sampling

B. Cluster Sampling

C. Stratified Sampling

D. None of the other options

*Explanation: See Chapter 3 Slide 12. In simple random sampling, cluster sampling and stratified sampling, every unit has a chance of being selected. Here, any vote other than the first 100 will not be selected.*

2. Peter is interested to know if NUS students are returning to school during the COVID-19 pandemic. He took a simple random sample of 1,000 students based on the entire list of NUS students. Only 250 responded to his survey, with 85% of them replying that they are returning to school at least once a week. Peter concluded that, generally, about 85% of all students return to school. Is his assertion valid?

* 1. Yes
  2. No

*Explanation: See Chapter 3 Slide 43. A high non-response rate distorts the results of studies because usually non-respondents differ from respondents. The higher the response rate, the more we will be able to extend the findings of the sample to the population.*

3. Jit wishes to find out if commuters are satisfied with the MRT system, by interviewing some of the people who leave the Kent Ridge station on a Monday morning. He rolled a fair 10-sided die with faces labelled 1, 2, to 10, which has equal chance of landing on any of the faces, and obtained the number 7. Then with the superb cooperation of the station master, he and a team of assistants are able to speak to the 7th commuter to leave the station in that morning, then the 17th commuter, the 27th commuter, and so on. Which of the following best describes the sampling plan used by Jit?

1. Systematic Sampling
2. Quota Sampling
3. Simple Random Sampling
4. None of the other options

*Explanation: See Unit 3, Slides 25-28, 48, for the different characteristics of Systematic, Quota and Simple Random Sampling.*

4. A publishing company wants to find out the readership in Singapore for a few of its magazines. The company divides Singapore into 20 regions, of which 5 regions are chosen randomly. The team then randomly chooses several blocks of flats in each region, followed by picking a simple random sample of household units within those blocks. Which sampling method best describes their method?

1. Simple random sampling
2. Cluster sampling
3. Stratified sampling
4. Multi-stage sampling
5. Systematic sampling

*Explanation: For multi-stage sampling, a sampling is carried out in stages, with smaller and smaller sampling units at each stage. A probability sampling plan is implemented at each stage.*

5. James is curious to find out how much NUS staff know about the economics term “free-rider”. He sends an assistant each to all the faculties in NUS, and instructs every assistant to speak to anyone who leaves the Dean’s Office after work on a Friday, until 10 responses are obtained, such that the sex ratio matches the faculty’s employees. For instance, in a faculty where 30% of the employees are male, the assistant is supposed to get responses from 3 males and 7 females. Which of the following best describes the sampling process?

1. Quota Sampling
2. Simple Random Sampling
3. Systematic Sampling
4. Stratified Sampling

*Explanation: See Chapter 3 Slide 48.*

6. Shauna lives in Chichaland, where 70% of the residents are young (<25 years old). She wonders if Chichaland is so young because of its famous bubble teas, and wishes to estimate the average number of cups of bubble tea the young Chichaland individuals drink a week. She constructs a list of the mobile phone numbers of all residents in the town and takes a simple random sample of 1,000 individuals using the list. Assuming that everyone in Chichaland owns exactly one mobile phone number, and that there is 100% response rate the survey, can the survey data be generalised to the population of young Chichaland individuals?

1. Yes
2. No

*Explanation: In the above context, the population of interest is the young individuals in Chichaland, while the sampling frame is the population of Chichaland itself. Therefore, it is still possible to generalise the findings of the 1,000 individuals sampled to the population of young individuals, though one may argue the sieving of unwanted units may require a substantial amount of work.*

7. Divide people into three groups by age: infant (<1 year), child (1-19 years), adult (>20 years). In a country, the deaths rates of for the first and last group are

rate(death | infant) = 6/1000

rate(death | adult) = 3/1000

We may conclude that rate(death | child) is between 3/1000 and 6/1000.

1. True
2. False

*Explanation: See Chapter 1 for the notation. Rate(death | child) cannot be calculated from the other two rates, which refer to different subpopulations. The given figures are approximately true of the US, where in fact rate(death | child) is around 3/10000. So the first year of life is most dangerous, the safest period are the childhood years. Adulthood comes with all kinds of risks: behavioural or physiological.*

8. The performance of common animals in mental tasks has been widely studied, and some results are contrary to expectations. Suppose that the intelligence scores of 200 animal species have an average of 100, and the pig's score is 121, which has standard unit 1.5. This means the standard deviation (SD) of the 200 scores is

1. 21 / 1.5
2. 21
3. 21 x 1.5
4. It cannot be determined from the given information.

*Explanation: See Chapter 2 for the definition of the standard unit. The pig’s score is 1.5 SDs above average, meaning 121 - 100 = 21 is equivalent to 1.5 SDs. To obtain the value of the SD, divide 21 by 1.5.*