S114_LE1_001

Statistics 114
August 6, 2012

First Long Examination
TGCapistrano

I.   TRUE OR FALSE. Write "True" if the statement is always true; otherwise, write "False".

1. Right after the researchers come up with a clear statement of the problem, identify the general and specific objectives of the study and completely define all terms to be used in the statistical inquiry they then start collecting data.
2. The statement of the research problem in a statistical inquiry may not be in a form of a question.
3. If we conduct a census, then we can use methods in Descriptive Statistics in order to summarize the collected data and come up with conclusions about the population of interest.
4. If we collect sample data, then the exact value of the parameter can be computed using the methods in Inferential Statistics on the sample data.
5. The National Statistics Office is the agency in the Philippines Statistical System that serves as the linkage between the data users and the agencies in the system collecting the data.
6. The development of probability theory was encouraged by gamblers and not statisticians.
7. The concept of the standard deviation was developed as early as the 16th century.
8. The ratio can be used to compare two measures taken on the same ordinal scale.
9. The relationships of equality and less than/greater than can be interpreted to compare two measures taken on the same interval scale.
10. Arranging the data from smallest to largest is meaningful even if the data were simply measured on an ordinal scale.
11. The computed average is meaningful even if the data used were simply measured on a nominal scale.
12. The survey method is the best data collection method in establishing cause-and-effect.
13. Personal interviews allow for the collection of the most wide-ranging type of information when compared to other methods of communication in a survey.
14. The results of focus group discussions need to be confirmed using more structured methods of data collection.
15. Latency recording is used in the observation method to collect objective quantitative data by measuring the length of time between the stimulus and the first occurrence of the behavior of interest.
16. If the sampling frame used to select the sample excludes many of the elements in the target population, then we expect that the size of the sampling error will be very large.
17. The sampling frame is a map or a list of all elements in the sampled population.
18. Purposive sampling will give each element in the population a known nonzero chance of inclusion in the sample.
19. We will always get more reliable estimates using data collected form a sample selected using a probability sampling method instead of non-probability sampling.
20. There are probability sampling methods where some elements of the population are given a larger chance of inclusion in the sample than the other elements.

II.   FILL IN THE BLANKS. Fill the blanks with the term/answer that will make the statement true.
1. The study of probability theory falls in one of the major fields of statistics called _____.
2. If the Office of the University Registrar (OUR) goes to the Human Resources Department of the university to get data on the educational attainment of the faculty and staff of the university then the OUR collected data using _____ data.
3. The data that appears in the thesis of a student who conducted a survey to collect the data for the thesis is classified according to source as _____ data.
4. The complete name of the policy-making and coordinating agency in the Philippine Statistical System (PSS) is _____.
5. The compete name of the lead agency in the PSS that is responsible for the statistical training of the people involved in the collection and analysis of data generated by the PSS is _____.
6. The part of the questionnaire used in a survey that is used to convince the respondent to participate in the study is called _____.
7. The type of close-ended question that provides more than two alternatives from which the respondent can choose as many responses that apply to him is called _____.
8. The two types of questionnaire are: a)_____ and b)_____.
9. The _____ is the last step in constructing a questionnaire where possible errors and problems in the questionnaire may be detected.
10. _____ is the process of determining the value or label of the variable based on what has been observed.
11. _____ is the error in the study that is attributed to the variation among the values of the statistic from the different possible samples consisting of n elements.
12. If there is very little variation among the values of the statistic (that will be used to estimate the parameter) from the different possible samples then the estimate computed from the selected sample is said to be _____.
13. The formula to compute for the chance that a particular element of the population consisting of N elements will be included in a sample of size n under simple random sampling with replacement is _____.
14. If there are 100 elements in the population and a sample of size 5 will be selected using systematic sampling then the value of the sampling interval is _____.
15. The non-probability sampling method which is the counterpart of the stratified sampling but does not use a randomization mechanism in the selection of the elements in the strata is called _____.

III.   ANSWER THE FOLLOWING QUESTIONS.
1. A sample of 50 students in a university will be selected using stratified random sampling where the major domains (Arts & Humanities, Social Sciences & Philosophy, and Math, Science and Technology) are the strata. In this university, there are 250 students in the Arts & Humanities, 120 in the Social Sciences & Philosophy and 500 in the Math, Science & Technology. How many students in the sample should be allocated in each stratum if proportional allocation will be used? Show your computation.

2. Elements in the population were each assigned a unique label from 1 to 895.
    a) Suppose a sample of 4 elements will be selected using simple random sampling without replacement. Use the table of random numbers and start at Row No. 4, Cols 8 to $(8 + i - 1)$ where i = number of columns needed. What are the labels of the 4 elements in the sample?

b) Suppose another sample of 4 elements will be selected but this time using systematic sampling. Use the table of random numbers and start at Row No. 10, Cols 24 to $(24 + i - 1)$ where $i =$ number of columns needed. What are the labels of the 4 elements in the sample?

3. The following items appeared in a portion of the questionnaire to be filled up by an applicant for a job. For each item, what is the level of measurement used to measure the variable?
   a) Year of Birth: _____
   b) Civil status (Encircle number):
      1 – Single   2 – Married   3 – Separated / Divorced   4 – Widowed
   c) Highest educational attainment (Encircle number):
      1 – Elementary   2 – High School   3 – College   4 – Masters   5 – PhD
   d) Number of Cars: _____
   e) (To be filled up by employer) Ranking of applicant: _____.

4. Suppose a researcher wishes to study the effects of applications of sulphur in reducing scab disease of potatoes. The objective of applying sulphur is to increase the activity of the soil, since scab does not thrive in very acid soil. The same variety of potatoes was grown on a piece of agricultural land that had the same type of soil everywhere. This piece of land was divided into 16 1-acre plot of land. Using a randomization mechanism, 4 1-acre plots were chosen where 300 lb per acre of sulphur was spread by hand on the soil; another 4 1acre plots were chosen where 600 lb per acre of sulphur was applied; another 4 1acre plots were chosen where 1200 lb per acre of sulphur was applied; and the last remaining 4 1-acre plots where no sulphur was applied. When harvest time comes, a sample of 100 potatoes was selected from each of the 16 plots of land. Each potato was graded by measuring the percentage of the surface area of the potato that is infected with scab. The scab index was measured from each plot of land by taking the average grade of the 100 potatoes.
   a) What method of data collection was used by the researcher?
   b) How many treatments are there in the study?
   c) What is the response variable?
   d) What extraneous variables were stated in the problem that the researcher was able to control?
   e) What did the researcher do to hopefully cancel out the effects on the response variable of the other extraneous variables that he was not able to control?

5. Suppose a manufacturer has designed a completely new package for his product and after a year of using this new package he decided to conduct a statistical inquiry to find out if his customers like it. For this study, he used a randomization mechanism to select a sample of supermarkets and groceries where his product is being sold and collected data by asking a series of questions to all of the customers in the selected supermarkets and groceries who purchase his product.
   a) What method of data collection was used by the manufacturer?
   b) What are the elementary units in his study?
   c) What are the sampling units in his study?
   d) What sample selection procedure did the manufacturer use to select his sample?

6. For each of the five questions below, answer in one sentence: What is the major flaw of the question? State the specific aspect of the question that makes it vague or confusing or biased or frustrating/difficult to answer. Assume that all questions appear in an interview schedule and

interviewers were instructed to read the questions as stated. Special instructions to interviewers are enclosed in braces.

a) How much water did you drink in the past 8 hours?

☐ Above Average   ☐ Average   ☐ Below Average

b) Did you study for the exam and sleep early last night. Yes or No?

☐ Yes   ☐ No

c) Do you agree that the college secretary should not allow freshmen to join any of the organizations in the School of Statistics, Yes or No?

☐ Yes   ☐ No

d) What type of novel do you enjoy reading the most? [Present showcard of options to respondent and simultaneously read the choices our loud.]

☐ Science Fiction   ☐ Horror   ☐ Mysteries   ☐ Others, please specify _____

IV.   Use the list of students on the next page as the sampling frame to select the sample using the indicated sampling method.

1.   Use stratified random sampling to select 12 sampling units, using the variable Y as the stratification variable so that students with the same value of Y belong in the same stratum. Use equal allocation to allocate the sample of size 12. Write the assigned number for each sampling unit on the questionnaire. Use the table of random numbers to generate the numbers needed. For the first set of numbers, start at Row 0, Cols 0 to $(0 + i - 1)$ where i = number of columns needed. For the second set of numbers, start at Row 0, Cols 4 to $(4 + i - 1)$ where i = number of columns needed. For the third set of numbers, start at Row 0, Cols 8 to $(8 + i - 1)$ where i = number of columns needed. Write the numbers generated and identify the students included in the sample on your bluebook.

2.   Use simple one-stage cluster sampling, using the variable Z as the cluster variable so that students with the same value of Z belong in the same cluster. Choose three sampling units in the sample. Use the table of random numbers to generate the numbers needed. Start at Row 0, Cols 12 to $(12 + i - 1)$ where i = number of columns needed. Write the numbers generated and identify the students included in the sample in your bluebook.

3.   Suppose X is the variable of interest. What do we require about the values of X in the population so that we can expect our estimate to have a high level of reliability using the sample selection procedure used in number 1?

4.   Suppose X is the variable of interest. What do we require about the values of X in the population so that we can expect our estimate to have a high level of reliability using the sample selection procedure used in number 2?

Name of Student	Y	Z
ABEAR, DAISY	1	1
ABINAL, CHRISTZA	1	1
ABUNDO, MELVIN	1	1
AGUS, CLARISSE	1	1
ALCANZAREN, MICHAEL	1	2
ANAYRON, FRANCES	1	2
BAGARINAO, ARIANNE	1	2
BANIQUED, MA. GAY	1	2
BARIAS, HAZEL	1	3
BASA, JANET	1	3
BAYANI, MA. FE	1	3
BIAG, ARLAINE	1	3
BORRES, DIANA	1	4
BRUTAS, HONEY	1	4
BULALACAO, JUDITH	1	4
CALUSIN, REAH LYN	1	4
CAPULE, MELANIE	1	5
CARIÑAGA, CATHERINE	1	5
CARO, SARAH	1	5
CASTILLO, ANGELO	1	5
CASTRO, JUAN	1	6
CASTRO, KORINA	1	6
CATALAN, JULIE	1	6
CATAPANG, KRISTINE	1	6
CAYOS, MARIA	1	7
CEQUEÑA, JOYLIN	1	7
CHIVA, HAZEL	1	7
CLAMOSA, JESSIE	1	7
CRUZ, APRIL	1	8
CRUZ, CEASAR	1	8
DANGUILAN, SAM	1	8
DAVID, ELIZABETH	1	8
DAYAO, KRIS	1	9
DELOS SANTOS, MAFEL	1	9
DENSING, CHRISTI	1	9
DIMAPILIS, RACHELLE	1	9
DUEÑAS, MARTINNE	1	10
DUMANLANG, MARJ	1	10
ENRIQUEZ, RONAN	1	10
ESPAÑOL, IRENE	1	10

Name of Student	Y	Z
ESTRADA, IVAN	2	11
FABIA, KAREN	2	11
FADRIGA, RONALD	2	11
FAUSTINO, KARL	2	11
GABRIEL, JOANN	2	12
GALANG, FLORENCE	2	12
GAMBA, DONNA	2	12
GAMBOA, RIVA	2	12
GAMENG, DONNA	2	13
GONZALES, GRACEZEL	2	13
HABARADAS, ROB	2	13
INTANO, IVY	2	13
IRINGAN, ELAINE	2	14
ISON, ANGELA	2	14
JIMENEZ, AIZA	2	14
JIMENEZ, TYM	2	14
LACSA, ZARAH	2	15
LAPUS, LEIRA	2	15
LAVA, ABNER	2	15
LIQUIDO, NERISSA	2	15
LUZ, KATHLEEN	2	16
MACAPINLAC, CHRISTINE	2	16
MACATUGGAL, JOEVERT	2	16
MAGPANTAY, CHERRY	2	16
MANIA, MARY	2	17
MANIGBAS, JULIE	2	17
MANZANO, WILMA	2	17
MARTIN, RUTH	2	17
MAYO, GIOVANNA	2	18
MAYOR, NOEMIE	2	18
MERCADO, CYNDI	2	18
MONTIBON, ROD	2	18
MORITO, MARIA	2	19
NARAG, JUVIE	2	19
NOVELOZO, APRIL	2	19
NUESCA, DAN	2	19
NUEVA, JENNIE	2	20
OPULENCIA, ROMELLA	2	20
PARALLAG, ROCHELLE	2	20
PARILLA, APRIL	2	20

Name of Student	Y	Z
PASCUA, MARK	3	21
PASCUAL, GRACE	3	21
PAZ, ZANDRA	3	21
RAMOS KATHREEN	3	21
RAMOS, GIANNE	3	22
RAMOS, VANESSA	3	22
RASCO, MARYCHEL	3	22
ROBILLOS, DIANNE	3	22
RODRIGUEZ, MARIA	3	23
RONDA, PAUL	3	23
SACMAN, RICARDO	3	23
SALAGUBANG, JENNIEBIE	3	23
SAN MIGUEL, KARLOS	3	24
SANDOVAL, MOVICA	3	24
SANTELLICES, JONATHAN	3	24
SANTOS, CAMELA	3	24
SANTOS, EDWARD	3	25
SARMIENTO, JOBELLE	3	25
SERRANO, AILEEN	3	25
SEVILLANO, ANNA	3	25
SIAZON, MELISSA	3	26
SING, MARIA	3	26
SISON, SHEENA	3	26
SOLOMON, MARY	3	26
SURELL, ERICSON	3	27
SURELL, RAFAEL	3	27
TACDERAS, MARK	3	27
TACUBAN, IRISH	3	27
TALPLACIDO, LOWELL	3	28
TENORIO, MARK	3	28
TORRES, TOSCA	3	28
VILLALARBO, CHERIE	3	28
VILLANUEVA, KARYL	3	29
VILLEGAS, MARY	3	29
YAP, DAVID	3	29