



SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN STATISTICS

STA 103: PRINCIPLES OF SAMPLE SURVEYS

DATE: 15TH DECEMBER, 2016

TIME: 8.00-10.00AM

INSTRUCTIONS

Answer question 1 and any other 2 questions

Question 1 (30 marks)

- a) Define the following terms
- (i) Research design.
 - (ii) Survey.
 - (iii) Sampling design. (3 marks)
- b) (i) Give the difference between stratified sampling and cluster sampling. (4 marks)
- (ii) Highlight three benefits of stratified sampling. (3 marks)
- c) Give three advantages and one disadvantage of simple random sampling. (4 marks)
- d) State and briefly explain four characteristics of research. (4 marks)
- e) Give four weaknesses of surveys. (4 marks)
- f) Out of the 1,395 colleges in the United States 364 have 2-year programs and 1,031 have 4-year programs. A simple random sample of forty five 2-year schools and an independent simple random sample of sixty-five 4-year schools were taken. The sample means and standard deviation of number of students enrolled in the past year in business statistics courses are given in the table below:

	2-year programs	4-year programs
Mean	164.3	421.8
Standard deviation	97.3	229.9

- (i) Estimate the total annual enrollment in business statistics courses. (3 marks)
- (ii) Estimate the standard deviation of the total population. (5 marks)

Question 2 (20 marks)

- a) State and explain seven characteristics of a good questionnaire. (7 marks)
- b) Give the difference between complete non-response and partial non response. (2 marks)
- c) Give two advantages of systematic sampling. (2 marks)
- d) (i) If x_1, x_2, \dots, x_n is a random sample from a distribution that is normally distributed i.e $x \sim \mu (H, 1)$. State the distribution of the sample mean \bar{x} . (1 mark)
- (ii). State and briefly explain importance of carrying a research. (8 marks)

Question 3 (20 marks)

- a) State and explain four types of household surveys giving one advantage of each type. (8 marks)
- b) The height of a new variety of sunflower can be modeled by a normal distribution with mean 2.1m and standard deviation of 42 cm. A random sample containing 60 sunflowers is taken and the mean height calculated.
 - (i) What is the probability that the sample mean lies between 196 cm and 206 cm? (4 marks)
 - (ii) Seventy such samples each with 60 observations are taken. In how many of these would you expect the sample mean to be greater than 215 cm ? (4 marks)
 - (iii) Estimate the total height for (ii) above. (1 mark)
 - (iv) Determine the 90% confidence interval for the population mean. (3 marks)

Question 4 (20 marks)

- a) State and briefly explain the three types of sampling methods. (6 marks)
- b) Construct 90% confidence interval for population mean. (5 marks)
- c) Heights of university students have a mean μ and variance σ^2 . A sample of 100 students indicate that the 95% confidence limits is (177.22cm, 197.8cm). Find;
 - (i) Standard deviation and the mean of the sample. (3 marks)

- (ii) 90% confidence interval. (2 marks)
- (iii) If the whole population is 3000, estimate the variance of the whole population and the variance of population proportion. (4 marks)

Question 5 (20 marks)

- a) State the difference between a parameter and a statistic. (2 marks)
- b) Medical research on altitudes of patients and treatment offered often entail sample surveys. Discuss possible errors that are bound to occur. (5 marks)
- c) Define a pilot survey and give advantages of carrying out a pilot survey (5 marks)
- d) Give four causes of response errors. (4 marks)
- e) State and briefly explain two types of research designs. (4 marks)