University of Ruhuna

2015/2016 Academic Year B.A. (Special) Degree
2000 Level 2nd Semester Examinations

STS 22613 – Infertile Statistics

Any four (04) Questions

03 Hours.

Calculators are allowed.
F table, t table and Z table are provided

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01. (a) Write down the concept of the Sample distribution and the Sampling distribution and explain the differences between those.

(05 Marks)

(b) Clearly write down the steps involved in construction of the Sampling distribution of a sample proportion.

(05 Marks)

(c) For boys, the average number of absences for lectures in state University's is 15 days per semester with a standard deviation of 07 days; for girls, the average number of absences is 10days with a standard deviation of 06 days. In nationwide survey, suppose 10 boys and 50 girls are sampled under simple random sampling. What is the probability that the Male students will have at most three more days of absences than the female students.

(05 Marks)

02. (a) Define the term "Point estimator" in inferential statistics. Write down two different examples of point estimators.

(04 Marks)

(b) A railway enthusiast Simulates train journeys and records the number of minutes, X, to the nearest minute, trains are late according to the schedule being used. A random sample of 50 journeys gave the following times.

17	05	03	10	04	03	10	05	02	14
03	14	05	05	21	09	22	36	14	34
22	04	23	06	08	15	41	23	13	07
06	13	33	08	05	34	26	17	08	43
24	14	23	04	19	05	23	13	12	10

P.T.O.

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If it is given that $\sum X^2 = 16526$, calculate unbiased estimate (for two decimal places) of

(i) Mean
(ii) Variance
(iii) Proportion of trains that are more than 25 minutes late
Of the population from which this sample was drawn.

(11Marks)

03. Let $X_1, X_2, X_3, \ldots\ldots\ldots\ldots\ldots\ldots X_{28}$ be a simple random sample from a probability distribution with probability density function, $X \sim Po(x; \lambda)$. Show that the sample mean $\bar{X}$ is a minimum variance unbiased estimator for population parameter λ.

(15 Marks)

04. An investor has developed a new, energy efficient lawn mower engine. He claims that the engine will run continuously for 05 hours (30 minutes) on four litters of petrol and it was found that run time follows a normal distribution. From his stock of 2000 engines, the inventor selects a simple random sample of 50 engines for testing. The engines ran for an average of 295 minutes, with a standard deviation of 20 minutes. Test the inventor's belief is true, i.e. mean run time is 300 minutes at the 05 percent level of significance.

(15 Marks)

05. Suppose a researcher is interested in testing whether a difference exist in mean monthly electricity consumption by households among the four regions in Sri Lanka. Following table provides the relevant data (date are reported in GWH)

Region			
North	Central	South	West
15	17	11	10
10	12	07	12
13	18	09	08
14	13	13	07
13	15	-	09
-	12	-	-

Answer the following questions based on above data.

P.T.O.

(a) State the null and alternative hypotheses giving necessary definitions

(02 Marks)

(b) Briefly explain the assumptions you need to test your null hypothecs.

(02 Marks)

(c) Give a decision Criterion to rejecter accept your null hypothesis.

(01 Marks)

(d) Test your null hypothesis under 5% level of significance and conclude your findings.

(10 Marks)

06. Criticize the following statements using your knowledge about inferential statistics

(a) Sampling is a compulsory in inferential statistics.

(b) It is known the standard error of a sampling distribution of the sample mean is given as $\frac{\sigma}{\sqrt{n}}$. When sample size is increasing from 20 to 30, standard error is also increasing accordingly.

(c) When you construct 99 percent confidence interval instead of 95 percent when other things equal, the calculated interval has no any change with compared to the previous one.

(d) When population standard deviation is not known, sample standard deviation can be a good estimate of population standard deviation.

(e) The sample mean is a biased point estimator of the population mean.

[15 = (03×05) Marks]

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