Mid-West University

Examinations Management Office

Surkhet, Nepal

Final Examinations -2079

Bachelor level/ B.Sc /4th Semester — Full Marks: 100

Time: 3 hrs — Pass Marks : 50

Subject : Statistical Inference I (STAT345)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks

GROUP A

1. Attempt all the questions. **[7x2=14]**

a. Define statistical inference.
b. Define method of maximum likelihood estimation.
c. How to find standard error of sample mean?
d. Write any four application of f-distribution.
e. Discuss the meaning of p- value.
f. What do you mean by most powerful test (MP test)?
g. Define level of significance.

Group-B

2. Attempt All the questions **[10x3=30]**

I. Prove that S.E($\bar{X}$) = $\frac{\sigma}{\sqrt{n}}$.
II. Show that the sample mean is more efficient estimator for μ then the sample median for large sample drawn from N(μ, σ^2).
III. Estimate the parameters μ *and* σ^2 of the normal distribution N(μ, σ^2) by the method of moments.
IV. Define type I error and type II error in testing of hypothesis.
V. Write the procedure for testing a hypothesis for paired t-test.
VI. Discuss the method of minimum chi-square for estimating the parameters of a distribution.
VII. Define best test and best critical region.
VIII. Write down test production of significance of a single mean.
IX. What do you understand by one of tail and two tail test in testing of hypothesis?
X. Explain power of a test.

Group-C

Attempts any eight questions **[8X7=56]**

3. Define test of significance of correlation coefficient. A random sample of 10 pairs of observation from a normal population give the following sum values $\sum x_1 = 650$, $\sum x_2 = 660$ $\sum x_1 x_2 = 45604$, $\sum x_1^2 = 47648$, $\sum x_2^2 = 45784$. Is it likely that the variables in the population are correlated? [2+5]
4. Prove that E($\frac{\partial log L}{\partial \theta}$)= 0 and V($\frac{\partial log L}{\partial \theta}$) = E($\frac{\partial log L}{\partial \theta}$)^2 = -E ($\frac{\partial^2 log L}{\partial^2 \theta}$) [2+5]
5. Test whether MVB estimator exists or not if the sample X = $x_1, x_2, \ldots, x_n$ is take from a poison population p(λ). [2+5]
6. State and prove that Neyman-Pearson Lemma. [7]
7. For exponential distribution with pdf f(x, θ) = $\theta e^{-x.\theta}$ $x > 0$, $\theta > 0$,based on the random sample size n .
   a) Find the MLE of parameter θ.
   b) Variance of the MLE.
   c) The estimate of the MLE and its variance of the sample observation are 0.9, 1.7, 0.4, 0.3, and 2.4.

   [2+3+2]
8. State and prove Cramer –Raw Inequality. [7]
9. Estimate α *and* β in case of sampling from a gamma population G(α, β) by the method of moments. [7]
10. Let p be the probability of getting a head in a single toss a coin. The coin is tossed 5 times and it is desired to test H_0: p =1/2 against H_1: p=2/3. The H_0 is rejected if more than 3 heads are obtained. Find the probabilities of type I and type II errors. Also find the power of the test. [3+3+1]
11. Explain the ideal proportion of good estimator. [7]

THE END