

Mid-West University
Examinations Management Office

Birendranagar, Surkhet

End Semester (Alternative/Physical) Examinations -2078

Bachelor level/ B.Sc /4th Semester

Full Marks : 60

Time: 3hrs

Pass Marks : 30

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.

Attempt the following questions

[6×10=60]

1. a) What is sampling? Write down concept of random sampling method. [5]
b) Explain sampling distribution of sample mean. [5]
2. Explain the relationship between hypothesis testing and confidence interval. Discuss standard error of sample mean and sample proportion. Also show that $E(p)=P$.
3. Define maximum likelihood estimator. Let $X = x_1, x_2, \dots, x_n$ be a random sample of size n from a Bernoulli distribution with probability mass function given by,

$$p(X, P) = \begin{cases} p^x(1-p)^{1-x}; & x = 0, 1, \quad 0 < p < 1 \\ 0 & \text{otherwise} \end{cases}$$

OR

Discuss confidence interval for mean of normal population. Prove the properties of likelihood function.

$$Var\left(\frac{\partial \log L}{\partial \theta}\right) = E\left(\frac{\partial \log L}{\partial \theta}\right)^2 = -E\left(\frac{\partial^2 \log L}{\partial \theta^2}\right).$$

4. Write down test procedure of significant of simple correlation coefficient. Explain likelihood ration test for the mean of normal population.
5. If t is an unbiased estimator of θ than show that t^2 is a biased estimator of θ^2 . In a gamma distribution with parameter α examine if MVB estimator exists, find MVB for the estimator.

OR

What do you understand by type I and type II error in testing of hypothesis? If $x > 3$ is a critical region for testing $H_0: \lambda = 1$ against $H_1: \lambda = 2$ based on a sample of size 1 drawn from a poisson population $p(\lambda)$. Find the probabilities of type I and type II errors and power of the test.

6. Discuss uses of critical region and p-value in hypothesis testing. Sales of new electronic items in six stores before and after special promotional program are observed as follows;

Stores	1	2	3	4	5	6
Sales before campaign	50	30	31	48	55	42
Sales after campaign	52	29	30	52	56	45

Can you judge the special promotional program is success?

$(\alpha = 0.01)$

THE END