

Master of Rural Studies (M.R.S.) Examination, 2019

Semester-II

Rural Studies

Course : XIII

(Elementary Econometrics)

Time : 3 Hours

Full Marks : 40

Questions are of value as indicated in the margin

1. Answer **any four** questions. 4×2.5=10
- Define Random variable.
 - Explain 'Orthogonal Regression' with the help of a diagram.
 - Distinguish between an event and elementary event.
 - Define 'Asymptotic Unbiasedness'.
 - State and prove Baye's theorem for two events A and B.
 - Define Type-I and Type-II error.
 - Prove $\frac{(n-1)s^2}{\sigma^2}$ is χ^2_{n-1} distribution. (s^2, σ^2, n have their usual meaning)
 - For the relation $y = x^2 + x - 2 + u$; where $0 \leq x \leq 2$; $u = 5$ with $p = \frac{1}{2}$ and $u = -5$, with $p = \frac{1}{2}$, find the values of y for the above "stochastic relation".
2. Answer **any two** questions. 2×5=10
- Briefly explain the features of classical inference system.
 - What is the concept of 'limiting distribution'? Explain it with the help of an example.
 - What are the major assumptions of simple linear regression model.
 - Prove that $\text{Total sum of squares (TSS)} = \text{Residual sum of square (RSS)} + \text{Explained sum of square (ESS)}$
 - If $X_1, X_2, \dots, X_n$ is a simple random sample from a population having finite value of ' μ ', then prove that $E(\bar{X}) = \mu$.
3. Answer **any two** questions. 2×10=20
- What are 'Outliers'? How outliers can be detected? Describe the steps of detection and deletion of 'Outliers' giving suitable graphical representation. 2+2+6=10
 - Give the definition and important properties of Normal, t, χ^2 and F- distribution with the help of suitable diagram. 2.5×4=10
 - Consider the following bivariate data for 10 workers, x = labour hours of work; and y = output

x	10	7	10	5	8	8	6	7	9	10
y	11	10	12	6	10	7	9	10	11	10

i) Give the estimated regression of y on x.

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ii) Give the estimated reverse regression equation of x on y.

iii) Calculate the SE of the coefficients (let $\hat{\alpha}$, $\hat{\beta}$).

(SE-standard error)

4+2+4=10

d) What is the prediction error? Derive the expression for the variance of prediction error. Find the 95% confidence interval for predicted value y_0 for $x_0 = 250$, given the relation $y = 10 + 0.9x$, where number of observation = 12; $\hat{\sigma}^2 = 0.01$; $\bar{x} = 200$; $S_{xx} = 4000$. ($t = 2.228$ with 10 degree of freedom for 95% confidence interval).

2+3+5=10

e) Describe the process of estimation of parameters used in 'Methods of least square' for a stochastic relation

$$y = \alpha + \beta x + u$$
