SEAT No._____ [49]

Sardar Patel University

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External Examination

M.Sc. Applied Statistics Semester IV (NC)

PS04EAST22:Econometrics

December 29, 2020, Tuesday

Marks: 70 Times: 10:00 a.m. to 12:00 p.m.

Q1(a) Multiple Choice Questions:

i. In context to scaling of residuals in the regression analysis, $|t_i| > 3$ indicates, presence of _____ in data.

(a) Leverage point (b) Influential point
(c) outlier (d) Extreme point

ii. In usual notation, in context ridge regression, the MSE of ridge estimator ($MSE(\hat{\beta}_R)$) is defined by_____.

(a) $\sum_{j=1}^{k}\left[\frac{\sigma^2\lambda_j + \vartheta^2}{(\lambda_j+\vartheta)^2}\right]$ (b) $\sum_{j=1}^{k}\left[\frac{\sigma^2\lambda_j + \vartheta^2\beta_j^2}{(\lambda_j+\vartheta)^2}\right]$

(c) $\sum_{j=1}^{k}\left[\frac{\sigma^2 + \vartheta^2\beta_j^2}{(\lambda_j+\vartheta)^2}\right]$ (d) $\sum_{j=1}^{k}\left[\frac{\sigma^2\lambda_j + \vartheta^2\beta_j^2}{(\lambda_j+\vartheta)}\right]$

iii. In context to the linear regression relation between the t and F statistic is_____.

(a) $t = \sqrt{F}$ (b) $t = F$
(c) $t = F^2$ (d) $F = t/N(0,1)$

iv. In context to the regression analysis, if the Durbin Watson test statistic (d) is _____, then we say the presence of negative autocorrelation.

(a) 2 (b) 4
(c) $4 - d_L < d < 4$ (d) $0 < d < d_L$

v. The Indirect Least Squares procedure of estimation is appropriate when simultaneous equations are

(a) Just or exact identified (b) Over identified
(c) Not identified (d) Under identified

vi. In the simultaneous-equation models, number of structural form coefficients are less than number of reduced form coefficients then given system is

(a) over identified (b) under identified
(c) exact identified (d) recursive system

vii. In context to the multicolinearity if the value of Variance Inflation Factor corresponds to j-th regressor (VIF_j) is 10 then value of R_j^2 is_____.

(a) 0.25 (b) 0.7
(c) 0.5 (d) 0.9

viii. Multiple linear regressions with p regressors, the Cook distance statistic D_i for i^{th} point is defined as_____.

(a) $\frac{r_i^2}{p}\frac{h_{ii}}{(1-h_{ii})}$ (b) $\frac{h_{ii}r_i^2}{p}$

(c) $\frac{r_i^2}{p^2}\frac{h_{ii}}{(1-h_{ii})}$ (d) $\frac{r_i}{p^2}\frac{h_{ii}}{(1-h_{ii})}$

Q1(B) Do As Directed

1. Under which condition, the Principal Component Regression Analysis is applicable? 16
2. Define BIC.
3. What do you mean by Pooled data? What is an alternate name of it?
4. For the model $y_i = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_k x_{ik} + \varepsilon_i,\ i = 1, \ldots, n,$ what is the degrees of freedom error?
5. Give the relation between the F and R^2.
6. Define endogenous variable.
7. TRUE or FALSE: In usual notation in the multiple linear regression with k variables having n observations, the distribution of Explained Sum of Square (ESS) is χ^2_{n-k}.
8. TRUE or FALSE: The Model $Y_i = \beta_1 + \beta_2 \left(\frac{1}{X_i}\right) + \varepsilon_i$ is known as reciprocal model.
9. TRUE or FALSE: In context to simple linear regression, the variance of future observation (y_0) based on value of the regression variable of interest (x_0) is $\sigma^2 \left(\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{s_{xx}}\right)$
10. TRUE or FALSE: In the Classical Linear Regression Model, LS estimate and ML estimate of σ^2 are unique.
11. TRUE or FALSE: In dummy variable regression, the Chow test is used to check presence of autocorrelation.
12. The Hausman Specification test is a test of _____.
13. In presence of the multicolinearity _____estimator is considered to be best.
14. _____method is used to choose appropriate value of bias constant in ridge regression.
15. _____ test of autocorrelation is also a test of model misclassification.
16. _____ point which does not affect the slope coefficient of regression line.

Q2. Short answer questions (Any Seven)

i. Give any two definition of Econometrics.
ii. Distinguish between R^2 and Adj. R^2.
iii. List the steps of Research Methodology of Econometrics.
iv. Write order conditions in system of simultaneous equations.
v. In context to the multicolinearity, define VIF and Conditional Index.
vi. Define the heteroscedasticity. Write the name of two formal tests to detect it.
vii. Define Durbin Watson Statistic. Give its application in Econometircs.
viii. Define Aitken estimator. Under which condition Aitken estimator reduces to OLS estimator.
ix. Is $y = exp\ (\beta x)$ is intrinsically linear model? Why?

Q3	Define Classical Linear Regression Model. Further obtain OLS estimate and ML estimate of $\underline{\beta}$ and σ^2.	08
	[OR]	
Q3	In usual notation, discuss constraint least squares method.	08
Q4	Explain tests for detecting hetroscedasticity.	08
	[OR]	
Q4	Define Autocorrelation. Is an autocorrelation creating problem in estimation of parameters in CLRM? Explain in detail.	08
Q5	Explain dummy variable regression model.	08
	[OR]	
Q5	Explain methods to detect multicolinearity.	08
Q6	In context of Econometrics, discuss simultaneous equations in detail.	08
	[OR]	
Q6	Is OLS method suitable to estimate parameters in simultaneous equations? Why? Further discuss estimation method, when system is exact identified.	08

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