ECONOMETRICS FINAL EXAM
Wednesday 17th May 2023

Family Name:	**Name:**
Grade:	**ID:**
Mobile:	**Email:**

Question 1	A	B	C	Blank
Question 2	A	B	C	Blank
Question 3	A	B	C	Blank
Question 4	A	B	C	Blank
Question 5	A	B	C	Blank
Question 6	A	B	C	Blank
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Question 12	A	B	C	Blank
Question 13	A	B	C	Blank
Question 14	A	B	C	Blank
Question 15	A	B	C	Blank
Question 16	A	B	C	Blank
Question 17	A	B	C	Blank
Question 18	A	B	C	Blank
Question 19	A	B	C	Blank
Question 20	A	B	C	Blank

Correct		Incorrect		Blank		Grade	

INSTRUCTIONS

This exam includes 20 multiple choice questions.

Your answers must be marked on the answer sheet that you will find in the first page. If you want to leave any question unanswered, choose the "Blank" option. This answer sheet is the only part of this exam that will be graded.

A correct answer adds 2 points to the final grade while an incorrect one subtracts 1 point. A blank answer does not add or subtract. The final grade is the number of points divided by 4.

Make sure that you checked your options, including “Blank”. Do not unclip the sheets. Use the blank space in the following pages to write notes or to do arithmetic calculations.

YOU HAVE ONE HOUR AND 15 MINUTES (75’) TO ANSWER THIS

REMINDER

YOU ARE NOT ALLOWED TO USE DEVICES WITH CONNECTIVITY TO THE INTERNET, INCLUDING MOBILE PHONES, TABLETS, SMARTWATCHES OR MP3/4 PLAYERS

Question 1. Consider the regression model [M1]: $Y = \beta_0 + U$ and the model [M2]: $Y = \beta_1 X_1 + U$, both estimated using OLS. Choose the right answer:

A. In model [M1] the R^2 is different from zero.
B. In both models the correlation between the fitted values of the dependent variable and the residuals is zero.
C. In model [M2] the sample mean of the residuals is zero.

Question 2. The following regression models have been estimated using OLS [M3]: $\hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 X_1$ and [M4]: $\hat{Y} = \hat{\alpha}_0 + \hat{\alpha}_1 X_1 + \hat{\alpha}_2 X_2$. If $\widehat{corr}(X_1, X_2) > 0$ and $\widehat{\alpha_2} > 0$, choose the right answer:

A. $\hat{\beta}_1 = \hat{\alpha}_1$
B. $\hat{\beta}_1 > \hat{\alpha}_1$
C. $\hat{\beta}_1 < \hat{\alpha}_1$

Question 3. If in the model $Y = \beta_1 + \beta_2 X_2 + U$ the p-value for the test $H_0: \beta_2 = 0$ against $H_1: \beta_2 \neq 0$ is equal to 1, then:

A. H_0 should be rejected at any significance level.
B. The t-statistic is equal to 0.
C. The other two answers are incorrect.

Question 4. The goal of the RESET is:

A. To evaluate the existence of influential observations.
B. To evaluate the existence of autocorrelation in the error term of a model.
C. To evaluate the existence of specification errors in the functional form of a model.

Question 5. In multiple linear regression model: $Y = X\beta + U$, where $E[U] = 0$ and $\text{Var}[U] = \sigma^2\Omega$ with $\Omega \neq I$, the White and Newey-West estimators are:

A. Estimators for β with smaller bias than the OLS estimator.
B. Adequate estimators for the variance-covariance matrix of the OLS estimator for β.
C. Estimators for β more precise than the OLS estimator.

Questions 6 to 8 refer to the following model:

$$Y_t = \beta_0 + \beta_1 X_t + \beta_2 D_{t2} X_t + \beta_3 D_{t3} X_t + \beta_4 D_{t4} X_t + \beta_5 D_{t2} + \beta_6 D_{t3} + \beta_7 D_{t4} + U_t,$$

where Y_t and X_t are, respectively, the logarithm of sales and the logarithm of quarterly advertisement expenditures of a firm, and D_{t2}, D_{t3}, D_{t4} are dummy variables for quarters 2, 3 and 4, respectively: $D_{tj} = 1$ if t is an observation belonging to quarter j and $D_{tj} = 0$ otherwise.

Question 6. The elasticity of sales against advertisement expenditure is equal to:

A. $\beta_1 + \beta_4$ for the 4th quarter.
B. β_1 for every quarter.
C. $\beta_2 + \beta_3 + \beta_4$ for every quarter but the first quarter.

Question 7. The hypothesis that the elasticity of sales against advertisement expenditures is the same in the first quarter and in the fourth quarter can be written as:

A. $\beta_1 = \beta_4$
B. $\beta_4 = 0$.
C. $\beta_1 + \beta_4 = 0$

Question 8. If the hypothesis test for null hypothesis $H_0: \beta_0 = 0$ against $H_1: \beta_0 \neq 0$ shows a positive t-ratio and a p-value equal to 0.08, then in the test for $H_0: \beta_0 = 0$ against $H_1: \beta_0 > 0$, choose the right answer:

A. The null hypothesis should be rejected at the 5% significance level
B. The null hypothesis should be rejected at the 1% significance level.
C. The null hypothesis should not be rejected at the 10% significance level.

Question 9. In practice, an adequate way to analyse the existence of autocorrelation in the error term of a regression model with times series data is:

A. Using the Breusch-Godfrey statistic.
B. Using the Jarque-Bera statistic
C. Using the Breusch-Pagan statistic.

Question 10. Which of the following tools is not adequate to detect the existence of influential observations in a regression model?:

A. The values h_{ii} from the main diagonal of the hat matrix.
B. The graph of the OLS residuals.
C. The Variance Inflation Factor (VIF).

Questions 11 to 13 are related to the following regression model:

$$RM = \beta_0 + \beta_1 RC_1 + \beta_2 RC_2 + U,$$

where RM is the yield of some financial asset in the medium term and RC_1, RC_2 are the yield of other financial assets in the short term. The OLS estimation with a sample of 30 observations shows the following results:

$$\hat{\boldsymbol{\beta}} = \begin{bmatrix} \hat{\beta}_0 \\ \hat{\beta}_1 \\ \hat{\beta}_2 \end{bmatrix} = \begin{bmatrix} 0.971115 \\ 0.379475 \\ 0.925134 \end{bmatrix}, \hat{\mathbf{V}} = \begin{bmatrix} 0.095442 & 0.028555 & 0.027354 \\ 0.028555 & 0.019887 & 0.003575 \\ 0.027354 & 0.003575 & 0.021756 \end{bmatrix},$$

where $\hat{\mathbf{V}} = \hat{\text{var}}(\hat{\beta})$ is the variance-covariance matrix for the OLS estimator.

Question 11. Knowing that Pr[t(27) ≤ 2.771] = 0.995 and that Pr[t(27) ≤ 2.052] = 0.975, it is possible to tell that:

A. β_1 is statistically significant at the 1% significance level.
B. β_2 is not statistically significant at the 5% significance level.
C. The other two answers are incorrect.

Question 12. The value of the t-ratio for the test that the partial effect of the RC_1 on RM is the same that the partial effect of the RC_2 on RM:

A. Cannot be calculated with the available information.
B. Is equal to −4.574.
C. Is equal to −2.938.

Question 13. If the Pr[-1.7033 ≤ t(27) ≤ 1.7033] = 0.90, the confidence interval at the 90% level of confidence for the parameter β_1 is equal to:

A. [0.1393, 0.6197].
B. [0.3456, 0.4133].
C. It cannot be calculated with the available information.

Question 14. The following regression model is estimated using OLS: $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + u$ with a random sample of size equal to 94. You know that the F-statistic for the $H_0: \beta_1 = \beta_2 = \beta_3 = 0$ is equal to 30. Which will be the value for the R^2 in this estimated model?

A. 0.5

B. 0.9

C. The other two answers are incorrect.

Question 15. The model $Y_i = \beta_0 + \beta_1 X_i + U_i$ shows $var(U_i) = \sigma^2 \frac{1}{Z_i^2}$ where σ^2 is a constant and Z_i is an observed variable. Choose the right answer:

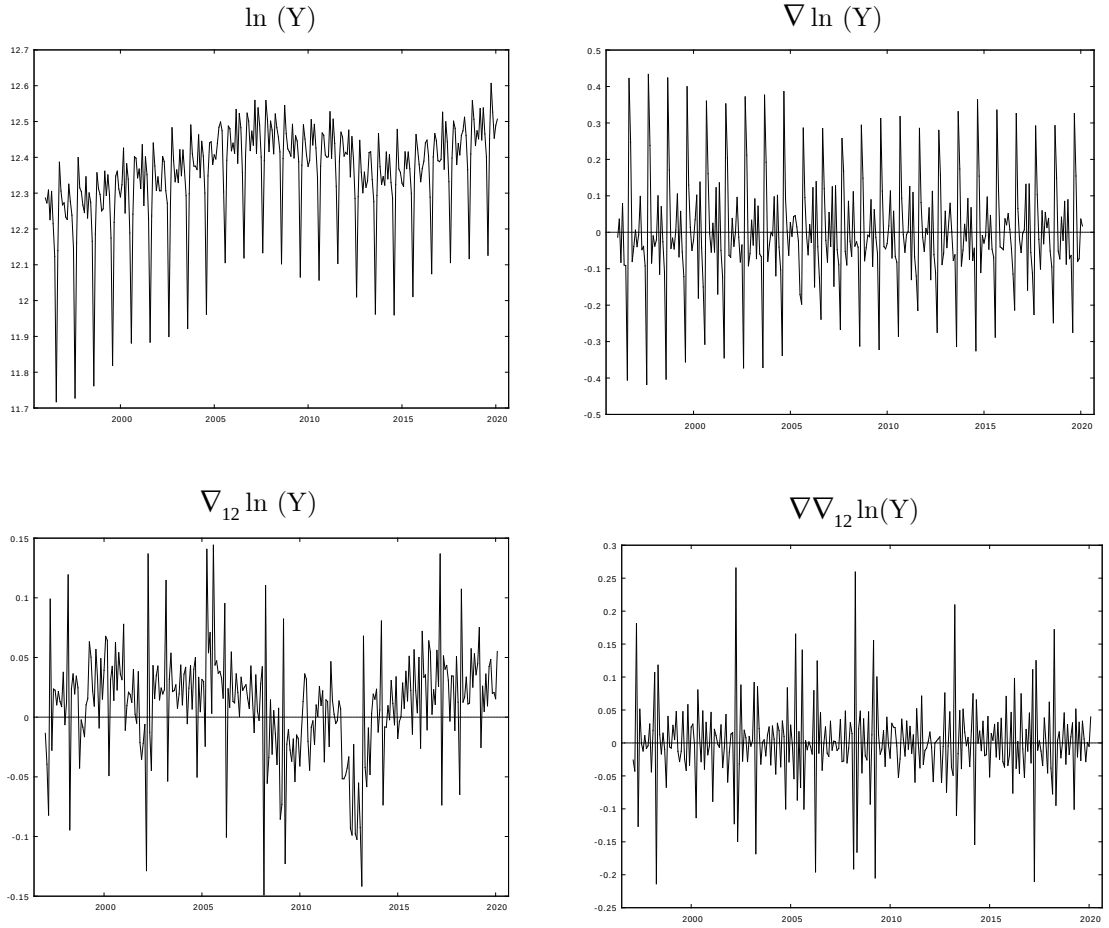
A. In the model $\frac{Y_i}{Z_i} = \beta_0 \frac{1}{Z_i} + \beta_1 \frac{X_i}{Z_i} + V_i$ the error term will be homoscedastic.

B. In the model $Y_i Z_i = \beta_0 Z_i + \beta_1 X_i Z_i + V_i$ the error term will be homoscedastic.

C. The other two answers are incorrect.

Questions 16 to 18 refer to the following statement: Figure 1 shows different transformation of the monthly time series Y: $\ln(Y)$ (natural log of Y), $\nabla \ln(Y)$ (first difference of the natural log of Y), $\nabla_{12} \ln(Y)$ (seasonal difference of the natural log of Y), $\nabla \nabla_{12} \ln(Y)$ (first difference of the seasonal difference of the natural log of Y).

FIGURE 1



Question 16. According to the patterns observed in Figure 1:

A. The series $\nabla \ln(Y)$ is mean stationary.

B. The series $\nabla_{12} \ln(Y)$ is mean stationary.

C. The other two answers are incorrect.

Question 17. Choose the right answer:

A. The series $\nabla_{12} \ln(Y)$ is an approximation for the monthly growth rate of Y.

B. The series $\nabla \ln(Y)$ is an approximation for the monthly growth rate of Y.

C. The series $\nabla \nabla_{12} \ln(Y)$ is an approximation for the quarterly absolute growth of Y.

Question 18. Choose the right answer:

A. If the series $\nabla_{12} \ln(Y)$ is regressed against a non-stationary times series using OLS, there would no risk of finding a spurious relationship.

B. The series $\nabla \nabla_{12} \ln(Y)$ could be regressed against a stationary times series so that the OLS estimation of the slope would always be efficient.

C. The other two answers are incorrect.

Question 19. Using a sample of 1,000 individuals, a researcher uses OLS to achieve the estimated model: $\hat{Y} = 5 + 1.5X$, where Y is the hourly salary in euros and X are years of education. Choose the right answer:

A. If $\widehat{corr}(Y, X) = 0.5$, the sample standard deviation of Y is the double of the sample standard deviation of X.

B. The other two answers are incorrect

C. It is possible that in the sample there is an individual with 10 years of education and hourly salary equal to 33 euros.

Question 20. Assume that you have a sample of 100 observations and you estimate the following model using OLS: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + u$, where you detect a collinearity problem. Which of the following strategies could mitigate the problem?

A. Add a new regressor to the model.

B. Increase the sample size.

C. The other two answers are incorrect.

OPERACIONES

EXAMEN FINAL DE ECONOMETRÍA
Miércoles 17 de Mayo de 2023

Apellidos:	**Nombre:**
Grado:	**Grupo:**
Nombre del profesor(a):	**Email:**

Antes de empezar a resolver el examen, rellene TODA la información que se solicita en los recuadros anteriores y lea con atención las instrucciones de la página siguiente.

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Correctas		Incorrectas		En blanco		Puntuación	