University of Batna 1
Faculty of Economic, Commercial and Management Sciences
Department of Finance and Accounting
First Year Master's – Specialization: Accounting and Taxation

Name and First name: …… ***Group:*** ……

May 15, 2025 **MODEL ANSWER FOR STATISTICAL SOFTWARE EXAM** ***Duration: 1 hour 30***

A researcher estimated the relationship between the dependent variable Y and the independent variables X1 and X2 using Eviews software. The regression output is presented in the table below. Based on these results, answer the following questions clearly and accurately, showing all necessary calculations where required.

Dependent Variable: Y
Method: Least Squares
Date: 05/14/25 Time: 22:30
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.973126	1.050827	-0.926058	0.3626
X2	3.201194	0.264786		0.0000
C	72.52362	7.928628		0.0000

R-squared	0.917957	Mean dependent var	148.4000
Adjusted R-squared	0.911879	S.D. dependent var	26.27126
S.E. of regression	7.798658	Akaike info criterion	7.040420
Sum squared resid	1642.115	Schwarz criterion	7.180540
Log likelihood	-102.6063	Hannan-Quinn criter.	7.085245
F-statistic	151.0471	Durbin-Watson stat	0.615403
Prob(F-statistic)	0.000000		

- questions:

1. **Nature of the Estimated Model**

What type of regression model is used here?

Answer: ... The model is a **multiple linear regression**

2. **Equation Specification in Eviews Format**

Write the Eviews command to estimate this model.

Answer: Y X1 X2 C ...

3. Mathematical Equation of the Model

Write the estimated regression equation using the coefficients from the table

Answer: $\widehat{Y} = 72.52362 - 0.973126 \cdot X1 + 3.201194 \cdot X2$

4. **Complete the Missing Values**

Calculate and fill in the missing t-statistic values for X2 and C.

Answer:

- t-statistic for X2: $t_{\hat{a}_2} = {}^{\text{Coefficient}}/_{\text{Std. Errort}} = {}^{3.2011}/_{0.2647} = 12.08$
- t-statistic for C: $t_{\hat{a}_0} = {}^{\text{Coefficient}}/_{\text{Std. Errort}} = {}^{72.5236}/_{7.9286} = 9.15$

5. State the **Coefficient of Determination** value and interpret its meaning.

Answer :$R^2 = 0.917957$

Interpretation: About **91.8%** of the variation in the dependent variable **Y** is explained by the independent variables **X1** and **X2** in the model. This indicates a very good fit.

6. **Statistical Significance of Coefficients**

Test the significance of the coefficients at $\alpha = 0.05$, given $t_{tab} = 2.045$:

- For $\hat{a}_0$ **(Intercept):**

Since Prob. ≈ 0.0000 < 0.05, we reject H₀ (null hypothesis: coefficient = 0).⇒ $\hat{a}_0$ is statistically significant.

- For $\hat{a}_1$ **(Coefficient of X1):**

Prob. = 0.3626 > 0.05 ⇒ We fail to reject H₀ ⇒ The coefficient of X1 is not statistically significant.

7. **Overall Significance of the Model**

Test the model's overall significance using the F-statistic, given $F_{tab} = 3.32$.

Answer: $F - statistic = 151.0471 > F_{tab} = 3.32$; Prob(F-statistic) = 0.000000 < 0.05 ; So we reject the null hypothesis that all coefficients are jointly equal to zero ⇒ The model is statistically significant overall.

Autocorrelation Test (Durbin-Watson)

Use the Durbin-Watson statistic to test for autocorrelation, given:

$$dL = 1.28, \quad dU = 1.57, \quad 4 - dU = 2.43, \quad 4 - dL = 2.72.$$

Answer: Since DW ≈ 0.61 < 1.28, there is evidence of positive autocorrelation in the residuals.

This violates the classical regression assumption of no autocorrelation.

8. **Breusch-Godfrey Autocorrelation Test**

If the Breusch-Godfrey test results are:

- $F - Statistic = 8.75$
- $p - value = 0.003$

What conclusion can you draw?

Answer: Since the p-values are < 0.05, we reject the null hypothesis of no autocorrelation.

⇒ Conclusion: There is evidence of autocorrelation in the model residuals.

- **Normality Test (Jarque-Bera)**

How would you test if the model's residuals follow a normal distribution in Eviews?

Answer: Click on: View → Residual Diagnostics → Histogram-Normality Test

- If: **(Jarque-Bera)** p-value > 0.05 ⇒ Fail to reject H₀ ⇒ Residuals are normally distributed.

What is the primary purpose of calculating Variance Inflation Factors (VIF) in regression analysis?

Answer : calculating (VIF) is to **detect multicollinearity** 1

9. Based on the VIF results below, interpret the findings:

Answer : VIF < 5⇒ There is **no severe multicollinearity** between X1 and X2 1

Variance Inflation Factors
Date: 05/14/25 Time: 23:43
Sample: 1 30
Included observations: 30

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
X1	1.104237	69.02951	2.321561
X2	0.070111	27.65768	2.321561
C	62.86314	31.00827	NA

10. The Dickey-Fuller test was applied to a time series, and the results are shown in the table below.

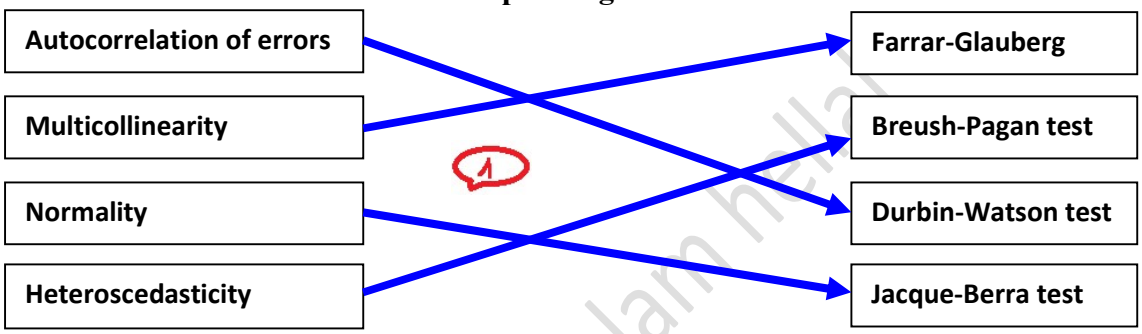
Do the results indicate that the time series is:

- ◯ ***Stationary.***
- ◯ ***homogeneous***
- ◯ ***independent*** 1
- ● ***non-stationary***

Null Hypothesis: Y has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.066613	0.6777
Test critical values:	1% level	-4.420595	
	5% level	-3.259808	
	10% level	-2.771129	

11. **Match each statistical issue with its corresponding test::**



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***12.* What are the steps involved in using Eviews software to test the stationarity of a time series?**
(Put the mark (X) in the correct suggestion)

- ☐ ***File / Unit Root Tests / Standard Unit Root Test / Augmented Dickey-Fuller***
- ☐ ***View / Residuel Diagnostic / Heteroskedasticity Test / Breush-Pagan-Godfrey***
- ☒ ***View / Unit Root Tests / Standard Unit Root Test / Augmented Dickey-Fuller*** 1

***13.* If the researcher wants to study the stationarity of the series, choose the correct test for him.**
(Put the mark (✓) in the correct suggestion)

- ☐ *Durbin-Watson test*
- ☐ *Breusch-Godfrey test*
- ✓ *Augmented Dickey-Fuller test* 0,5

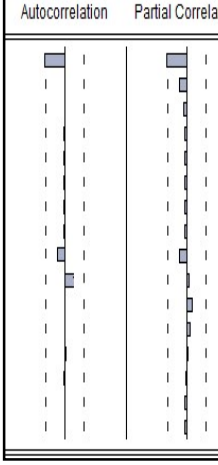
14. the researcher tested the existence of the unit root.
What method do you suggest to him in order to complete the test on Eviews? *(Put the mark (✓) in the correct suggestion)*

- ☐ File/Unit Root Tests/Standard Unit Root Test/ Augmented Dickey-Fuller
- ■ View/Unit Root Tests/Standard Unit Root Test/ Augmented Dickey-Fuller 1
- ☐ View/Residuel Diagnostic/ Heteroskedasticity Test/Breush-Pagan-Godfrey

17. After the researcher found that the time series becomes stationary after first differencing, what are the proposed models based on the corresponding correlogram? ⟶

ARIMA(1,1,1) , ARIMA(1,1,0), ARIMA(0,1,1) 1,5

Date: 05/04/25 Time: 13:45
Sample (adjusted): 2000Q2 2010Q2
Included observations: 39 after adjustments



	AC	PAC	Q-Stat	Prob
1	-0.338	-0.338	4.8007	0.028
2	-0.002	-0.131	4.8009	0.091
3	-0.004	-0.057	4.8018	0.187
4	-0.018	-0.045	4.8169	0.307
5	-0.012	-0.041	4.8235	0.438
6	-0.012	-0.039	4.8303	0.566
7	-0.012	-0.039	4.8376	0.680
8	-0.012	-0.040	4.8452	0.774
9	-0.342	-0.425	11.072	0.271
10	0.318	0.033	16.635	0.083
11	-0.003	0.090	16.636	0.119
12	0.006	0.058	16.638	0.164
13	0.010	0.023	16.644	0.216
14	-0.010	-0.013	16.651	0.275
15	-0.004	-0.026	16.652	0.340
16	0.002	-0.032	16.652	0.408