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ECON 0150 | MiniExam 08 | Demo

This MiniExam will take 8 minutes with a quick break to follow. MiniExams are designed to both test your knowledge and challenge you to apply familiar concepts in new environments. Treat it as if you're trying to show me that you understand the material. Answer clearly, completely, and concisely.

Academic Conduct Code

The following academic conduct code is designed to protect the integrity of your work. Print your name/initials beside the three academic honesty agreements. I pledge to my fellow students, the university, and the instructor, that:

✓ I will complete this MiniExam solely using my own work.
✓ I will not use any digital resources unless explicitly allowed by the instructor.
✓ I will not communicate directly or indirectly with others during the MiniExam.

Q1. A researcher is analyzing monthly retail sales data from 2018-2023 and includes just four quarter dummy variables in their model. Which of the following is the interpretation of the coefficient for the Q3 dummy variable?

$y = \beta_0 + \beta_1 \cdot Q_2 + \beta_2 \cdot Q_3 + \beta_3 \cdot Q_4$

A) The average sales in Q3 across all years ←
B) The difference in sales between Q3 and Q1 (the reference category)
C) The percentage growth in sales during Q3
D) The total sales in Q3 compared to the entire year

Q2. In a first-difference model for time series data, what is transformed?

$y_t - y_{t-1} = \Delta y_t$

A) Each observation is subtracted from the sample mean
B) Each observation is divided by the standard deviation
C) Each observation is subtracted from its previous period value
D) Each observation is compared to a reference category

Q3. Which of the following models would best capture how the effect of education on income differs between men and women?

$y = \beta_0 + \beta_1 \cdot edu + \beta_2 \cdot edu \cdot MALE$

A) Income = $\beta_0 + \beta_1 \cdot$Education + $\beta_2 \cdot$Male + ε

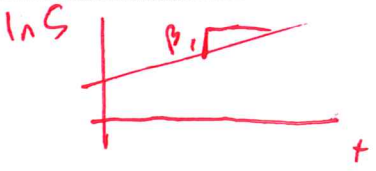
B) Income = $\beta_0 + \beta_1 \cdot$Education + $\beta_2 \cdot$Male + $\beta_3 \cdot$(Education×Male) + ε

C) Income = $\beta_0 + \beta_1 \cdot$Education + $\beta_2 \cdot$Experience + $\beta_3 \cdot$Male + ε

D) log(Income) = $\beta_0 + \beta_1 \cdot$Education + $\beta_2 \cdot$Male + ε

Q4. In a regression model with a time variable and quarterly binary indicator variables:

$$\log(Sales) = \beta_0 + \beta_1 \cdot Time + \beta_2 \cdot Q2 + \beta_3 \cdot Q3 + \beta_4 \cdot Q4 + \varepsilon$$



The coefficient β_1 represents:

A) The seasonal effect on sales

B) The quarterly growth rate of sales

C) The average sales level in the base period

D) The underlying trend in sales after accounting for seasonality

Q5. Consider the following regression output for a model examining the relationship between GDP growth rate and unemployment rate changes. Outcome variable: GDP_growth_rate = y %Δ GDP

	Coefficient	Std. Error	t-value	p-value
Intercept	2.15	0.31	6.94	<0.001
Δ Unemployment	−0.73	0.24	−3.04	0.004

$\%\Delta gdp = \beta_0 + \Delta un + \varepsilon$

a) Interpret the intercept (β_0) in this model.

The growth rate of gdp with no unemployment is 2.15.

b) Interpret the coefficient for Δ Unemployment (β_1).

Every increase in unemployment is associated with a 0.73 decline in gdp growth rate.

c) Explain why a first-difference model might be preferred over a levels model for this analysis. (5 points)

It reduces the problem of autocorrelation.

Q6. The following model examines the effect of education on wages, with an education and gender interaction:

$$\log(Wage) = \beta_0 + \beta_1 \cdot Education + \beta_2 \cdot Male + \beta_3 \cdot (Education \times Male) + \varepsilon$$

a) What does β_1 represent in this model?

The returns to education.

b) What does β_3 represent in this model?

The additional returns to education for those with Male = 1.

c) If $\beta_1 = 0.08$, $\beta_2 = 0.15$, and $\beta_3 = 0.03$, calculate the ~~percentage~~ increase in wages associated with one additional year of education for women and for men. One additional year of edu is associated with a β_1 increase in wages for female and $\beta_1 + \beta_3$ for male.

Q7. For each of the following scenarios, specify the appropriate model equation (include all variables and parameters):

a) Analyzing the impact of monthly temperature on energy consumption with fixed effects for different cities.

$ENERGY = \beta_0 + \beta_1 \cdot TEMP + C(cities) + \varepsilon$

b) Examining how changes in inflation rates affect changes in unemployment rates (using time series data).

$\Delta UN = \beta_0 + \beta_1 \cdot \Delta Inflation + \varepsilon$