Name: _____ **Student ID:** _____

ECON 0150 | MiniExam 09 | Spring 2025

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.

Housing Market Analysis

A researcher is investigating factors affecting residential property values across different metropolitan areas. The dataset contains the following variables:

- `price`: Housing price in thousands of dollars
- `sqft`: Property size in square feet
- `age`: Age of the property in years
- `bedrooms`: Number of bedrooms
- `distance`: Distance to city center in miles
- `quarter`: Quarter of observation (1-4)
- `urban`: Dummy variable (1 if property in urban area, 0 if suburban)

Q1. The researcher wants to examine whether the relationship between property size and price differs between urban and suburban areas. Which regression model would be most appropriate?

A) $price = \beta_0 + \beta_1 \cdot sqft + \beta_2 \cdot urban + \varepsilon$
B) $price = \beta_0 + \beta_1 \cdot sqft + \beta_2 \cdot urban + \beta_3 \cdot (sqft \times urban) + \varepsilon$
C) $price = \beta_0 + \beta_1 \cdot sqft + \beta_2 \cdot age + \beta_3 \cdot bedrooms + \varepsilon$
D) $\log(price) = \beta_0 + \beta_1 \cdot \log(sqft) + \beta_2 \cdot urban + \varepsilon$

Q2. The researcher suspects that the effect of distance to city center on housing prices varies with property age. Which approach would best capture this relationship?

A) $price = \beta_0 + \beta_1 \cdot distance + \beta_2 \cdot age + \beta_3 \cdot bedrooms + \varepsilon$
B) $price = \beta_0 + \beta_1 \cdot distance + \beta_2 \cdot age + \beta_3 \cdot (distance \times age) + \varepsilon$
C) $price = \beta_0 + \beta_1 \cdot distance + \beta_2 \cdot age + \beta_3 \cdot bedrooms + \beta_4 \cdot (bedrooms \times age) + \varepsilon$
D) $price = \beta_0 + \beta_1 \cdot distance + \beta_2 \cdot \log(age) + \beta_3 \cdot \log(bedrooms) + \varepsilon$

Q3. The researcher observes that the relationship between property size and price appears non-linear, with each additional square foot contributing less to the price at larger house sizes. Which transformation would best capture this relationship?

A) Including $sqft^2$ as an additional predictor
B) Using log(sqft) instead of sqft
C) Creating dummy variables for property size quartiles
D) Using first differences ($\Delta sqft$) instead of size levels

Q4. The data shows significant heteroskedasticity when modeling housing prices across different metropolitan areas. Which approach would most effectively address this issue?

A) Using robust standard errors
B) Modeling price changes ($\Delta price$) rather than price levels
C) Adding more property characteristic variables
D) Using a log transformation of the dependent variable

Q5. The researcher hypothesizes that the effect of number of bedrooms on housing prices varies by property size. Write the complete regression specification (using β coefficients) that would test this relationship.

Q6. The data shows clear quarterly patterns in housing prices throughout the year:

a) Write a regression model that would identify these seasonal patterns while controlling for property size and age.

b) How would you interpret the coefficient on the Quarter 2 dummy variable in this model?