

Name: TAYLOR'S VERSION

Student ID: _____

ECON 0150 | MiniExam 4 | Fall 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

Correct: Full
Partially: Partial
Incorrect: 1
Blank: 0

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:

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

20 Q1. A study uses data from 80 employees to examine whether remote workers have different productivity scores than in-office workers. Remote workers have an average productivity score of 82 and in-office workers have an average score of 78.

5 pts a) If we code remote as 1 for remote workers and 0 for in-office workers, write the regression model:

$$\text{PROD} = \beta_0 + \beta_1 \times \text{remote} + \epsilon \quad \leftarrow 3 \text{ pts if PROD and Remote are flipped}$$

5 pts b) Based on the information given, what would β_0 equal? $\beta_0 = 78$

5 pts c) Based on the information given, what would β_1 equal? $\beta_1 = 4$ \leftarrow partial for 82: 2 pts

5 pts d) What is the default null hypothesis for β_1 ? $\beta_1 = 0$

18 Q2. You want to test whether temperature predicts ice cream sales using daily data from a local shop with variables **temperature** (in °F) and **sales** (in dollars).

6 pts a) Write down a statistical model to test this question.

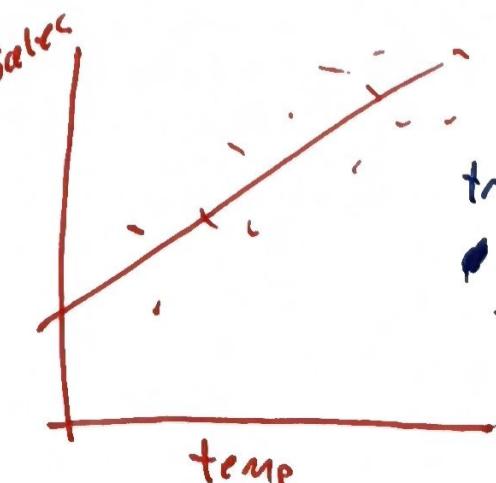
$$\text{sales} = \beta_0 + \beta_1 \times \text{temp} + \epsilon \quad \leftarrow 3 \text{ pts if } x \text{ and } y \text{ are flipped}$$

6 pts b) What part of your statistical model would indicate that temperature affects sales?

β_1

6 pts c) Sketch (to the right ->) how you would visualize this model.

XXXXXXXXXXXXXX



try to identify opportunities for partial credit

12 Q3. You want to examine whether age predicts hourly_wages using a sample of n=250 workers.

6 a) Write down a statistical model to test this relationship.

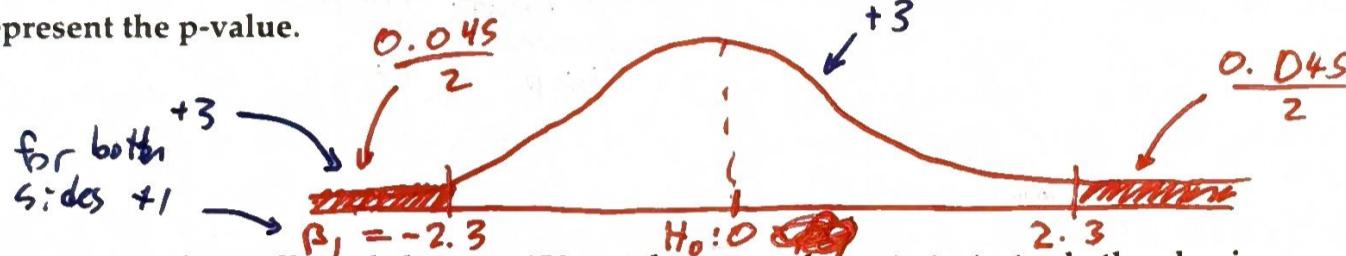
$$\text{wages} = \beta_0 + \beta_1 \times \text{age} + \epsilon$$

Partial credit for flipped x and y

6 b) If your regression yields $\beta_1 = 0.85$, interpret this coefficient in context:

Every additional year of education is associated with a 0.85 higher wage.

10 Q4. Draw the sampling distribution under the null hypothesis ($H_0: \beta_1 = 0$) for a slope coefficient that has an observed value of -2.3 with a p-value of 0.045. Mark our observed coefficient and shade the region(s) that represent the p-value.

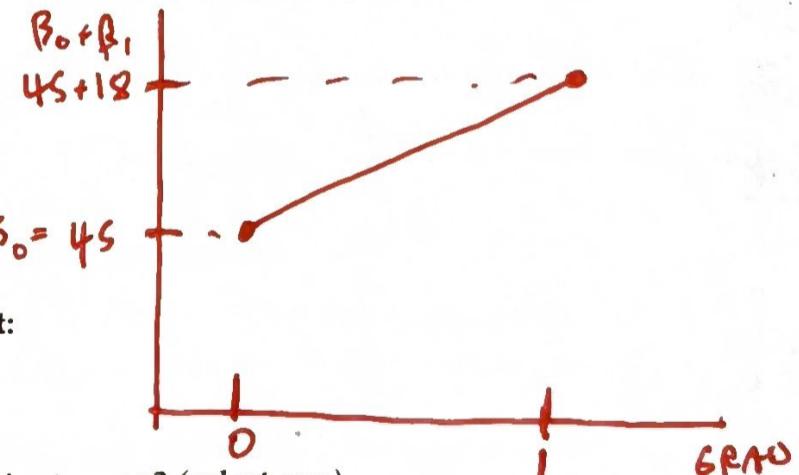


Q5. A researcher collected data on 150 employees and wants to test whether having a graduate degree affects annual income. The regression output shows: that its zero or centered on beta_1

| | coef | std err | t | P> t | [0.025 | 0.975] |
|-----------------|--------|---------|--------|-------|--------|--------|
| Intercept | 45.200 | 2.100 | 21.524 | 0.000 | 41.044 | 49.356 |
| graduate_degree | 18.500 | 5.250 | 3.524 | 0.001 | 8.129 | 28.871 |

Note: graduate_degree is coded as 1 = Yes, 0 = No; income is in thousands of dollars.

6 a) Sketch (to the right ->) how you would visualize the fitted model. Label intercept and slope using the fitted values.



6 b) Interpret the Intercept coefficient (45.20) in context: The average wage without a grad degree.

6 c) Interpret the coefficient on graduate_degree (18.50) in context: The additional income for those with a graduate degree.

6 d) What does the p-value of 0.001 for the graduate_degree coefficient mean? (select one)

- Out of 1000 samples where graduate degrees truly matter, only 1 would show a coefficient this large
- If graduate degrees are unrelated to income, 0.1% of samples would have a coefficient this far from zero
- Only 0.1% of the income difference between groups is due to random chance
- There's a 99.9% probability that the true coefficient is at least 18.5
- The coefficient of 18.5 has a 0.1% margin of error

6 e) Sketch (to the right ->) a residual plot showing heteroskedasticity in this model.

