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ECON 0150 | MiniExam 06 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 testing whether a job training program impacts earnings. The collected data shows a sample mean difference of \$450 (treatment - control) with a standard error of \$200.

a) Which of the following correctly describes the sampling distribution of the mean difference under the null hypothesis of no effect?

- ☒ It follows a normal distribution centered at \$450
- ☒ It follows a normal distribution centered at \$0
- ☐ It follows a t-distribution centered at \$450
- ☒ It follows a t-distribution centered at \$0

b) The p-value for this test is 0.028. Which statement most accurately explains what this p-value means?

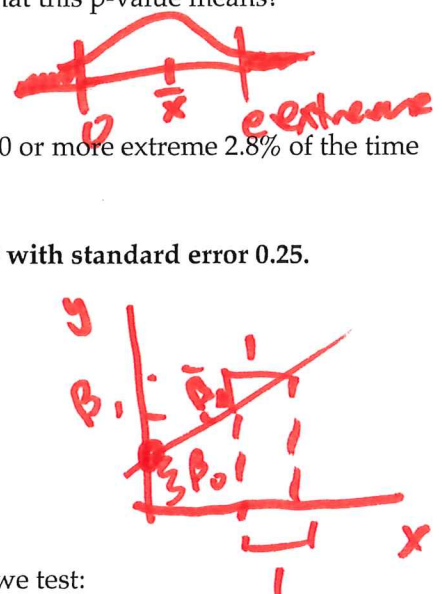
- ☒ There's a 2.8% chance that the job training program has no effect
- ☐ There's a 2.8% chance that the sample mean difference is \$450
- ☒ If the job training program truly had no effect, we'd observe a difference of \$450 or more extreme 2.8% of the time
- ☐ The probability that our conclusion is wrong is 2.8%

Q2. Consider a simple linear regression model: $y = \beta_0 + \beta_1 x + \varepsilon$, where $\beta_1 = 0.75$ with standard error 0.25.

a) The interpretation of the coefficient β_1 is:

- ☐ For every one-unit increase in y , x increases by 0.75 units on average
- ☒ For every one-unit increase in x , y increases by 0.75 units on average
- ☐ When $x = 0$, y equals 0.75 on average
- ☐ 75% of the variation in y is explained by x

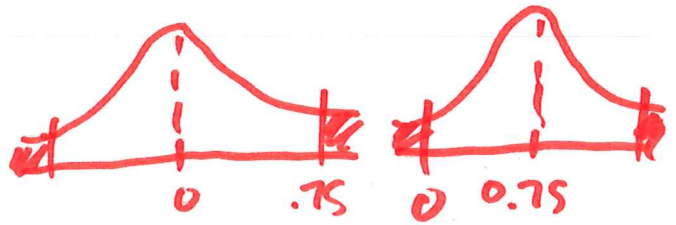
b) To test whether there's a statistically significant relationship between x and y , we test:



- ☒ $H_0: \beta_0 = 0$ versus $H_1: \beta_0 \neq 0$
- ☒ $H_0: \beta_1 = 0$ versus $H_1: \beta_1 \neq 0$
- ☒ $H_0: \beta_1 = 0.75$ versus $H_1: \beta_1 \neq 0.75$
- ☒ $H_0: y = 0$ versus $H_1: y \neq 0$

c) The null distribution for testing the above hypothesis follows a:

- ☒ Normal distribution with mean 0 and standard deviation 0.25
- ☒ Normal distribution with mean 0.75 and standard deviation 0.25
- ☒ t-distribution with mean 0 and standard error 0.25
- ☒ t-distribution with mean 0.75 and standard error 0.25

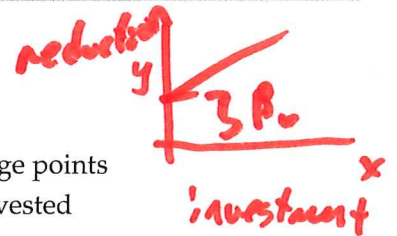


Q3. A researcher conducted a study on climate action, running a regression model predicting a city's carbon emission reduction (percentage points) based on renewable energy investment (millions of dollars), with the following results:

	coef	std err	t	P> t	[0.025	0.975]
<u>intercept</u>	<u>2.750</u>	<u>0.931</u>	2.954	<u>0.007</u>	0.857	4.643
investment	1.246	0.325	3.834	<u>0.001</u>	<u>0.586</u>	<u>1.906</u>

a) The most accurate interpretation of the intercept coefficient is:

- ☒ The average emission reduction across all cities is 2.75 percentage points
- ☒ When renewable investment is zero, the predicted emission reduction is 2.75 percentage points
- ☒ The emission reduction increases by 2.75 percentage points for each million dollars invested
- ☒ 2.75% of the variation in emission reduction is explained by renewable investment



b) The 95% confidence interval for the investment coefficient tells us that:

- ☒ We are 95% confident that renewable investment has a statistically significant effect on emission reduction
- ☒ If we took many samples, 95% of the calculated confidence intervals would contain the true investment coefficient
- ☒ 95% of cities have an investment effect between 0.586 and 1.906
- ☒ The true investment coefficient is between 0.586 and 1.906 with 95% probability

c) Which statement about the regression results is correct?

- ☒ Both the intercept and investment have statistically significant effects at $\alpha=0.05$
- ☒ The effect of the intercept is exactly 2.954 times larger than the effect of investment
- ☒ The p-value on investment indicates there's a 0.1% chance that renewable investment increases emission reduction
- ☒ We've proven that renewable investment causes emission reduction