

Midterm

⚠ This is a preview of the draft version of the quiz

Started: May 5 at 10:38pm

Quiz Instructions

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<https://uoregon.zoom.us/j/91388850911?pwd=NkNsdDdDWfpycUp4NTh2b3RyOHFWQT09>

Question 1

2 pts

If you confirm that you have not cheated on this exam—and will not cheat on this exam—then type **your name** as the answer.

If you do not answer this question, you will receive a zero on the exam.

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Question 2

4 pts

For the (estimated) linear regression model

$$\text{Guilty}_i = 0.21 - 0.04 \text{ Age}_i + e_i$$

the variable *Guilty* is a binary indicator for whether a defendant in a court case was found guilty and *Age* is the defendant's age at the time of the trial.

Using this model, by how much does a **10-year increase** in the defendant's *Age* reduce the probability that the defendant is found guilty?

Reminder: Probabilities are between 0 and 1 (so your answer should be between 0 and 1).

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Question 3

4 pts

For the (estimated) linear regression model

$$\text{Guilty}_i = 0.23 + 0.43 \text{ Young}_i + e_i$$

the variable *Guilty* is a binary indicator for whether a defendant in a court case is found guilty and *Young* is a binary indicator for whether the defendant was younger than 30 years of age.

Using this model, what is the **estimated probability** that a 45-year-old defendant is found to be guilty?

Reminder: Probabilities are between 0 and 1 (so your answer should be between 0 and 1).

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Question 4

4 pts

For the (estimated) linear regression model

$$\text{Guilty}_i = 0.09 + 0.07 \text{ Young}_i + 0.03 \text{ Male}_i + 0.18 (\text{Young}_i) \times (\text{Male}_i) + e_i$$

- the variable *Guilty* is a binary indicator for whether a defendant in a court case is found guilty
- *Young* is a binary indicator for whether the defendant is below 30 years of age
- *Male* is a binary indicator for whether the defendant is male

Based upon this model, how much more likely (as a **probability**) is it that an 18-year old male is found guilty relative to a 40-year old male?

Reminder: Probabilities are **between 0 and 1** (so your answer should be between 0 and 1).

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Question 5

4 pts

For the (estimated) linear regression model

$$\log(\text{Income}_i) = 0.4 + 0.5 \log(\text{Education}_i) + e_i$$

- Income_i is an individual's income (in thousands of dollars)
- Education_i is an individual's education (in years)

How do we interpret the coefficient on education?

- ☐ A 1-percent increase in education is associated with a 0.5% increase in income (holding all else constant).
- ☐ A 1-year increase in education is associated with a 50% increase in income (holding all else constant).
- ☐ A 1-year increase in education is associated with a \$500 increase in income (holding all else constant).
- ☐ The correct answer is not given.

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Question 6

4 pts

For the (estimated) linear regression model

$$\text{Income}_i = 0.4 + 0.5 \text{ Education}_i + e_i$$

- Income_i is an individual's income (in thousands of dollars)
- Education_i is an individual's education (in years)

How do we interpret the coefficient on education?

- ☐ The correct answer is not given.
- ☐ A 1-year increase in education is associated with a \$500 increase in income (holding all else constant).
- ☐ A 1-percent increase in education is associated with a 0.5% increase in income (holding all else constant).
- ☐ A 1-year increase in education is associated with a 50% increase in income (holding all else constant).

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Question 7

3 pts

R squared (R^2) tells us the share of the variance in y for which our regression model can account.

☐ True

☐ False

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Question 8

3 pts

Regressing y on x rather than $\log(y)$ on $\log(x)$ can cause heteroskedasticity.

☐ True

☐ False

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Question 9

3 pts

In the presence of omitted variables, OLS is biased *and* inconsistent.

☐ True

☐ False

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Question 10

3 pts

Measurement error in the explanatory variable (as defined in lecture) biases OLS regression estimates (of coefficients) downward.

☐ True

☐ False

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Question 11

3 pts

An omitted variable that

(1) is correlated with an included explanatory variable

and

(2) affects our outcome variable

violates our assumption of *exogeneity*.

☐ True

☐ False

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Question 12

3 pts

You are conducting a White test for heteroskedasticity.

Your original model is:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u$$

True or False: The regression in your White test should include the interaction between x_1 and x_2 .

☐ True

☐ False

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Question 13

3 pts

Definitions:

- $Income_i$ is an individual's income (in thousands of dollars)
- $Education_i$ is an individual's education (in years)
- $Female_i$ is an indicator for whether the individual is female

The linear regression model below allows the effect of an education on income to differ between females and non-females.

$$Income_i = 0.4 + 0.5 Education_i + 0.3 Female_i + e_i$$

☐ True

☐ False

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Question 14

3 pts

If an estimator b is unbiased for an unknown parameter β , then $\text{plim } b = \beta$.

☐ True

☐ False

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Question 15

3 pts

Weighted least squares (WLS) and OLS will produce different estimates for both the coefficients and the standard errors.

☐ True

☐ False

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Question 16

3 pts

Omitting variables causes OLS to be biased.

☐ True

☐ False

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Question 17

3 pts

Measurement error happens when we have an explanatory variable that is correlated with an omitted variable.

☐ True

☐ False

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Question 18

3 pts

Heteroskedasticity-robust standard errors are unbiased when our disturbance is heteroskedastic *and* when the disturbance is homoskedastic.

☐ True

☐ False

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Question 19

3 pts

The linear regression model below assumes that each additional year of education has the same effect on income.

$$\text{Income}_i = 0.4 + 0.5 \text{ Education}_i + 0.3 \text{ Female}_i + e_i$$

☐ True

☐ False

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Question 20

3 pts

In the presence of heteroskedasticity, weighted least squares (WLS) is more efficient than OLS because it downweights observations whose disturbances have small variances.

☐ True

☐ False

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Question 21

3 pts

If an estimator is *unbiased*, then it is also *consistent*.

☐ True

☐ False

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Question 22

3 pts

Imagine you have a dataset with individual's incomes and their sexes.

True or False: If we regress $Income_i$ on an intercept and the variable $Female_i$ (a binary indicator variable for whether individual i is female), then the coefficient on $Female_i$ will tell us the average difference in incomes between females and non-females in our sample.

☐ True

☐ False

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Question 23

3 pts

If the variances of our disturbances are correlated with an explanatory variable, then we have violated exogeneity.

☐ True

☐ False

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Question 24

3 pts

To determine whether an individual's health affects her income, you estimate the following model using OLS regression:

$$\text{Income}_i = \beta_0 + \beta_1 \text{Health}_i + u_i$$

When testing $H_0: \beta_1 = 0$, you get a *p-value* of 0.96.

True or False: The hypothesis test of β_1 will conclude that health does not affect income.

☐ True

☐ False

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Question 25

3 pts

Consistency refers to the mean of an estimator's distribution as we repeat the estimation an infinite number of times.

☐ True

☐ False

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Midterm

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Question 26

3 pts

The expected value of a random variable gives the variable's median value (in the population).

☐ True

☐ False

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Question 27

3 pts

We are interested in estimating the relationship between *Income* and *Experience*, but we're concerned about omitted-variable bias. Specifically, we're concerned about the omitted variable *Ability*.

Suppose the **true model** is

$$\text{Income}_i = \beta_0 + \beta_1 \text{Experience}_i + \beta_2 \text{Ability}_i + u_i$$

but we omit *Ability*.

Suppose

- $\beta_0 > 0$
- $\beta_1 > 0$
- $\beta_2 > 0$
- *Experience* and *Ability* are uncorrelated.

How does omitting *Ability* affect our estimate for the coefficient on *Experience*?

- ☐ OLS will be biased downward.
- ☐ OLS will be unbiased.
- ☐ The correct answer is not given.
- ☐ OLS will be biased upward.

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Question 28

3 pts

We are interested in estimating the relationship between *Income* and *Experience*, but we're concerned about omitted-variable bias. Specifically, we're concerned about the omitted variable *Ability*.

Suppose the **true model** is

$$\text{Income}_i = \beta_0 + \beta_1 \text{Experience}_i + \beta_2 \text{Ability}_i + u_i$$

but we omit *Ability*.

Suppose

- $\beta_0 > 0$
- $\beta_1 < 0$
- $\beta_2 < 0$
- *Experience* and *Ability* are negatively correlated.

How does omitting *Ability* affect our estimate for the coefficient on *Experience*?

- ☐ OLS will be unbiased.
- ☐ The correct answer is not given.
- ☐ OLS will be biased upward.
- ☐ OLS will be biased downward.

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Question 29

3 pts

We are interested in estimating the relationship between *Income* and *Experience*, but we're concerned about omitted-variable bias. Specifically, we're concerned about the omitted variable *Ability*.

Suppose the **true model** is

$$Income_i = \beta_0 + \beta_1 Experience_i + \beta_2 Ability_i + u_i$$

but we omit *Ability*.

Suppose

- $\beta_0 > 0$
- $\beta_1 > 0$
- $\beta_2 > 0$
- *Experience* and *Ability* are positively correlated.

How does omitting *Ability* affect our estimate for the coefficient on *Experience*?

- ☐ The correct answer is not given.
- ☐ OLS will be unbiased.
- ☐ OLS will be biased downward.
- ☐ OLS will be biased upward.

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Question 30

3 pts

If heteroskedasticity is present, then which of the following statements are true?

(Check all correct answers. Assume all other assumptions are met.)

- ☐ OLS coefficients are unbiased.
- ☐ WLS is more efficient than OLS.
- ☐ OLS standard errors are biased downward.
- ☐ WLS standard errors are valid.
- ☐ OLS standard errors are biased upward.

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Question 31

3 pts

If you detect the presence of heteroskedasticity, which of the following methods are "solutions" to the problems associated with heteroskedasticity?

(Choose all correct answers.)

- ☐ Checking your specification
- ☐ Heteroskedasticity-robust standard errors.
- ☐ Run a White test.
- ☐ Removing outliers
- ☐ Weighted least squares

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Question 32

3 pts

What are the "problems" caused by heteroskedasticity?

- ☐ Biased standard errors
- ☐ Invalid inference
- ☐ OLS is less efficient
- ☐ Biased coefficients
- ☐ Exogeneity is an invalid assumption.

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