

-- No calculators, phones, or other devices permitted. --

First Name and Last Name _____

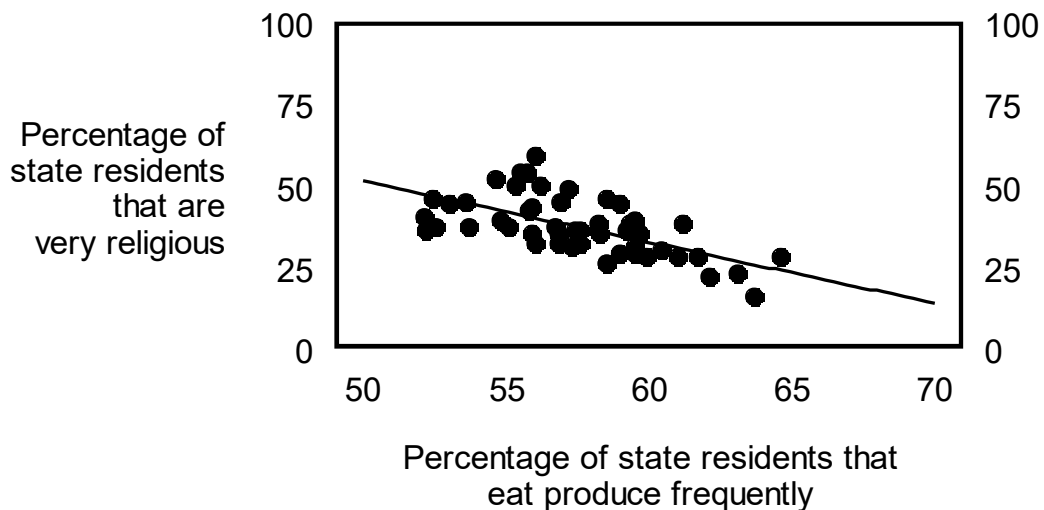
This practice exam focuses on material new for Exam 2, but material eligible for Exam 2 includes material from Exam 1 and from online notes for Chapters 8 and earlier. This practice exam has a few open-ended items that could be converted to multiple-choice items for the actual exam and/or appear on open-ended Exam 4.

[Directions for the actual exam, not this practice exam] Please write your first and last name on this page. Using a No. 2 pencil, on the opscan, write and bubble in the letters for your last name and first initial, write in "POL" for "DEPT.", write in "138" for "COURSE", and then bubble in your responses. No need for University ID or other information.

POL 138-003 Quantitative Reasoning in Political Science

KEY Practice Exam 2 · Fall 2025

1. In the plot below, each dot represents a state in the United States. The plot indicates that the correlation between the percentage of state residents that eat produce frequently and the percentage of state residents that are very religious is ____.
A. a positive correlation
B. a negative correlation
C. a zero correlation



2. Randomly assigning participants to groups helps a randomized experiment identify causes by ____.
A. eliminating demand effects as much as possible
B. helping as much as possible to avoid regression toward the mean
C. getting the sample to be as representative of the population as possible without weighting
D. getting the groups to be as similar to each other as possible before the difference in treatment

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3. Of the following, which term is most appropriate to describe a measure of the extent to which the values of one variable associate with the values of another variable?
- A. a percentile
 - B. a correlation**
 - C. an inference
 - D. a standard deviation

[Items 4 through 7] The linear regression output below is for the plot on the prior page, in which **PCTEATPRODUCEFREQ** (the percentage of state residents that eat produce frequently) is the variable on the horizontal x-axis and **PCTRELIGVERY** (the percentage of state residents that are very religious) is the variable on the vertical Y-axis:

PCTRELIGVERY	Coef.	p-value	[95% Conf. Interval]	
PCTEATPRODUCEFREQ	-1.86	0.000	-2.55	-1.16
constant/intercept	143.89	0.000	104.03	183.75

4. The 143.89 coefficient on the constant/intercept indicates _____.
- A. the predicted PCTRELIGVERY if PCTEATPRODUCEFREQ is zero**
 - B. the predicted PCTEATPRODUCEFREQ if PCTRELIGVERY is zero
 - C. the change in the predicted value of PCTRELIGVERY for each one-unit increase in PCTEATPRODUCEFREQ
 - D. the change in the predicted value of PCTEATPRODUCEFREQ for each one-unit increase in PCTRELIGVERY
5. The -1.86 coefficient on PCTEATPRODUCEFREQ indicates _____.
- A. the predicted PCTRELIGVERY if PCTEATPRODUCEFREQ is zero
 - B. the predicted PCTEATPRODUCEFREQ if PCTRELIGVERY is zero
 - C. the change in the predicted value of PCTRELIGVERY for each one-unit increase in PCTEATPRODUCEFREQ**
 - D. the change in the predicted value of PCTEATPRODUCEFREQ for each one-unit increase in PCTRELIGVERY
6. Does the output contain sufficient evidence to conclude at the conventional level in political science that the percentage of state residents that eat produce frequently associates with the percentage of state residents that are very religious?
- A. Yes**
 - B. No
7. Does the output contain sufficient evidence to conclude at the conventional level in political science that eating produce frequently causes U.S. residents to be more likely to be very religious, at least on average?
- A. Yes
 - B. No**

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8. Which of the following best indicates what a placebo is?
- A. a treatment that has an effect
 - B. a treatment that has no effect**
 - C. a treatment that has a positive effect
 - D. a treatment that has a negative effect
9. How do control variables help improve causal inference in a correlational study?
- A. reduce bias in measurements
 - B. randomly assign participants
 - C. remove sample bias
 - D. help address alternate explanations**

[Items 10 and 11] The table below indicates that, among a hypothetical set of four men academics and four women academics, only 50 percent of the men who applied for tenure received tenure, but 75 percent of the women who applied for tenure received tenure.

Men academics		Women academics	
Tenure	Publications	Tenure	Publications
No	10	No	10
No	10		
Yes	20	Yes	20
		Yes	20
Yes	30	Yes	30

10. In the table, women were ___ more likely to receive tenure than men were to receive tenure.
- A. 25 percentage points, because 75 percent minus 50 percent is 25 percent**
 - B. 50 percentage points, because 75 minus 50 is 25, and 25 divided by 50 is 50 percent
11. Among these eight academics in the table, women were more likely than men to have received tenure. Some people might interpret this as women having had an unfair advantage over men. Considering only statistical control for the number of publications, which inference below is most supported?
- A. The data suggest that women were less likely than men to receive tenure, controlling for number of publications.
 - B. The data suggest that women were as likely as men to receive tenure, controlling for number of publications.**
 - C. The data suggest that women were more likely than men to receive tenure, controlling for number of publications.

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12. The table below indicates that, among a different hypothetical set of four men academics and four women academics, all of whom applied for tenure, 75 percent of men who applied for tenure received tenure and 75 percent of women who applied for tenure received tenure.

Men academics		Women academics	
Tenure	Publications	Tenure	Publications
No	10	No	10
Yes	20	Yes	10
Yes	20	Yes	20
Yes	30	Yes	30

Among these eight academics in the table, women were as likely as men to have received tenure. Some people might interpret this as neither men nor women having an unfair advantage over each other. Considering only statistical control for the number of publications, which inference below is most supported?

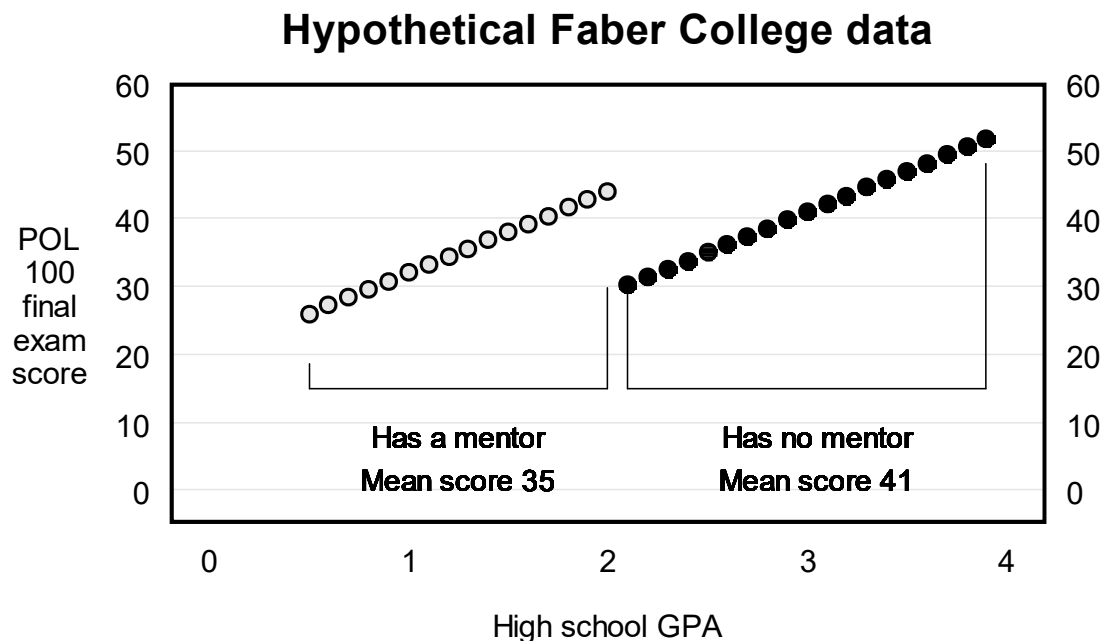
- A. The data suggest that women were less likely than men to receive tenure, controlling for number of publications.
- B. The data suggest that women were as likely as men to receive tenure, controlling for number of publications.
- C. The data suggest that women were more likely than men to receive tenure, controlling for number of publications.

13. Suppose that an instructor permitted students to submit each assignment in Canvas up to two times. Suppose that the data indicated that students who submitted assignments in Canvas two times had a lower mean score on the in-person final exam compared to students who submitted assignments in Canvas only one time, with a p-value of $p < 0.05$ for a test of the null hypothesis that the mean final exam scores equal each other. Is this sufficient evidence to conclude at the conventional level in political science that submitting assignments in Canvas two times caused students to have a lower mean score on the in-person final exam compared to submitting assignments in Canvas only one time, at least on average among these students?

- A. Yes, because the p-value is $p < 0.05$.
- B. No, because the analysis did not address alternate explanations, such as the possibility that strong knowledge of course content causes students to score high on the final exam and causes students to perform well enough on their first attempt at an assignment so that these students do not feel the need to submit the assignment a second time.

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14. Among Faber College students, 900 students major in business and 80 students major in sociology. Ten percent of Faber College students are randomly selected to win a prize. Due to random chance, the percentage of students selected for the prize is not exactly ten percent in each major: the lowest observed percentage of prize winners is 7 percent among students in one of the majors, and highest observed percentage of prize winners is 13 percent among students in another of the majors. Which major below is more likely to have been the major in which 13 percent of majors were selected for the prize?
- A. business
B. sociology
15. Suppose that Faber College has a program that assigns freshman students a mentor if and only if the student had a high school GPA that was 2.0 or lower. Each Faber College freshman must take a POL 100 course. The plot below indicates, for each Faber College freshman, the student's high school GPA, the student's final exam score in POL 100, and whether Faber College assigned the student a mentor.



Suppose that we use a discontinuity method to estimate the effect of having a mentor on a student's POL 100 final exam score, by comparing how much the final exam score among students who were just below the threshold for getting a mentor differs from the final exam score among students who were just above the threshold for getting a mentor. Which of the following best indicates that estimate?

- A. The mentor reduced final exam scores by about 15 points, on average.
B. The mentor reduced final exam scores by about 6 points, on average.
C. The mentor did not affect final exam scores, on average.
D. The mentor increased final exam scores by about 6 points, on average.
E. The mentor increased final exam scores by about 15 points, on average.

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16. Random assignment error in a randomized experiment ____.
- A. can bias an estimate of an effect only to be lower than it truly is
 - B. can bias an estimate of an effect only to be higher than it truly is
 - C. can bias an estimate of an effect to be lower than or higher than it truly is
 - D. cannot bias an estimate
17. Suppose that a researcher conducted a randomized experiment and then compared the mean response from participants in the control group to the mean response from participants in the treatment group. The p-value was $p=0.01$ for a test of the null hypothesis that these means equal each other. Based on this p-value, the researcher should conclude that ____.
- A. the treatment had an effect
 - B. the treatment did not have an effect
 - C. there is not enough evidence to conclude that the treatment had an effect
18. Suppose that a researcher conducted a randomized experiment and then compared the mean response from participants in the control group to the mean response from participants in the treatment group. The p-value was $p=0.25$ for a test of the null hypothesis that these means equal each other. Based on this p-value, the researcher should conclude that ____.
- A. the treatment had an effect
 - B. the treatment did not have an effect
 - C. there is not enough evidence to conclude that the treatment had an effect
19. Suppose that a researcher is interested in the extent to which college causes persons to become more politically liberal. In 2019, the researcher surveys a representative sample of age-18 persons who attend college and a representative sample of age-18 persons who do not attend college. Four years later, in 2023, the researcher surveys each person again. Suppose that the researcher's data are in the table below, in which political ideology is measured from 0 for extremely liberal to 100 for extremely conservative.

Group	Mean ideology at age 18	Mean ideology at age 22
Persons in college	40	30
Persons not in college	50	48

If the researcher used a difference-in-differences design that compared persons in college to persons not in college, the researcher's estimate of the effect of college on political ideology would be that college ____.

- A. made persons in the sample about 2 units more liberal on average
- B. made persons in the sample about 8 units more liberal on average
- C. made persons in the sample about 10 units more liberal on average
- D. made persons in the sample about 15 units more liberal on average

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20. Which one of the following indicates a difference between a randomized experiment and a natural experiment?
- A. In a natural experiment, the experiment must be conducted outside.
 - B. In a natural experiment, computers must not be used for the data analysis.
 - C. In a natural experiment, the outcome variable must be a measure of a natural phenomenon.
 - D. In a natural experiment, the assignment of the treatment must be done by nature or as if by nature.
21. Suppose that, on January 1, 2024, Freedonia enacted the Unemployment Reduction Act. Researchers are interested in assessing the extent to which the Unemployment Reduction Act caused a change in Freedonia's unemployment rate. Oceania is a country immediately next to Freedonia and is similar to Freedonia in every way, except that Oceania did not enact any legislation to reduce unemployment.

Unemployment Rate				
	2021	2022	2023	2024
Freedonia	9%	8%	7%	3%
Oceania	9%	8%	7%	8%

Considering a difference-in-differences method, what do the data in the table above suggest about the decrease in unemployment in Freedonia between 2023 and 2024?

- A. The Unemployment Reduction Act was plausibly the reason for the decrease in unemployment in Freedonia between 2023 and 2024.
 - B. The Unemployment Reduction Act was probably not the reason for the decrease in unemployment in Freedonia between 2023 and 2024.
22. Suppose that, for two participants, a researcher has data from two surveys, one in April and another in June of the same year. For each participant and for both months, the dataset has an indication of the participant's political party (D or R) and an indication of whether the participant supports or opposes affirmative action. Data are below, with each participant identified with an ID:

ID	April	June
1	D + Oppose	D + Support
2	R + Support	R + Oppose

Based on these data only, which of the following is more supported?

- A. political party influences attitudes about affirmative action
- B. attitudes about affirmative action influences political party

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23. Suppose that researchers are interested in the extent, if any, to which having an internship at ISU affects the salary of a student six months after graduation. Six months after graduation, Researcher A measures and then compares the mean salary among ISU graduates who had an internship to the mean salary among ISU graduates who did not have an internship. Six months after graduation, Researcher B measures and then compares the mean salary among ISU graduates who had at least a 3.0 GPA and who had an internship to the mean salary among ISU graduates who had at least a 3.0 GPA and who did not have an internship.

An advantage of Researcher B's research design over Researcher A's research design is that ____.

- A. Researcher B will address an alternate explanation
 - B. Researcher B will avoid bias due to regression toward the mean
 - C. Researcher B will avoid Simpson's paradox
 - D. Researcher B will have a smaller sample size
24. Suppose that, at Faber College, enrollment in the political science major decreased 3% each year from 2018 through 2020. At the start of 2021, the political science department hired a new department chair, and enrollment increased 2% each year from 2021 through 2023. For estimating how the new chair affected enrollment rates in the political science major, which of the following would provide the better comparison for a difference-in-differences design, based on only the enrollment rates indicated below?
- A. the history major at Faber College, in which enrollment decreased 3% each year from 2018 through 2020
 - B. the sociology major at Faber College, in which enrollment increased 2% each year from 2021 to 2023

[Items 25 and 26] A researcher randomly selects 2,000 people from the population of U.S. residents and then randomly assigns 1,000 of these people to a group that receives Treatment A and randomly assigns the other 1,000 people to a group that receives Treatment B.

25. The random selection from the population ____.
- A. better permits the researcher to make an inference about U.S. residents
 - B. better permits the researcher to make an inference about whether Treatment A has a different effect than Treatment B has among participants in the sample
26. The random assignment to groups ____.
- A. better permits the researcher to make an inference about U.S. residents
 - B. better permits the researcher to make an inference about whether Treatment A has a different effect than Treatment B has among participants in the sample

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27. In a non-experimental analysis, omission of a relevant control variable ____.
- A. can bias an estimate of an effect only to be lower than it truly is
 - B. can bias an estimate of an effect only to be higher than it truly is
 - C. can bias an estimate of an effect to be lower than or higher than it truly is
 - D. cannot bias an estimate
28. In a non-experimental analysis, including a control variable that should not be included ____.
- A. can bias an estimate of an effect only to be lower than it truly is
 - B. can bias an estimate of an effect only to be higher than it truly is
 - C. can bias an estimate of an effect to be lower than or higher than it truly is
 - D. cannot bias an estimate
29. The output below is from a linear regression on data from the ANES 2020 Time Series Study that used a participant's education (in a variable called **EDUC**) to predict the participant's rating about scientists (in a variable called **FTSCIENTISTS**). The **EDUC** predictor is coded so that 0 is a high school degree only, 1 is some college, 2 is a BA/BS four-year college degree only, and 3 is a graduate degree.

FTSCIENTISTS	Coef.	p-value
EDUC		
Some College	3.15	0.000
BA/BS Degree	6.70	0.000
Grad Degree	9.90	0.000
constant/intercept	74.56	0.000

- What does the 3.15 coefficient estimate for "Some College" indicate?
- A. The mean of **FTSCIENTISTS** among participants with some college
 - B. The mean of **FTSCIENTISTS** among participants with an average level of education
 - C. How much the mean of **FTSCIENTISTS** among participants with some college differs from the mean of **FTSCIENTISTS** among participants who have a high school degree only
30. If Hispanics are 16 percent of a population and 10 percent of a sample, what weight should be applied to each Hispanic person in the sample, if weighting on only race/ethnicity?
- A. 16×10
 - B. $16 \div 10$
 - C. $10 \div 16$
 - D. $10 \div (10 + 16)$
 - E. $16 \div (10 + 16)$

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31. Suppose that the 95% confidence interval for the mean political ideology in a sample is [60, 70]. The 99% confidence interval for the mean political ideology in the sample will be ____.
- A. thinner than [60,70]
 - B. [60, 70]
 - C. wider than [60, 70]
32. A researcher tested the null hypothesis that an association is zero. The p-value for this test $p=0.75$. Based on this p-value, a researcher using the conventional level in political science should ____.
- A. conclude that the association is zero
 - B. conclude that the association is not zero
 - C. do neither of the above
33. If the p-value is $p=0.00001$ for a single statistical test of a null hypothesis that there is no association, do we have enough evidence to claim that there is statistically significant evidence for the association?
- A. Yes
 - B. No

[Items 34 and 35] Suppose that Amy randomly samples 800 ISU students, Bob randomly samples 600 ISU students, and Amy and Bob each measure the height of each student in their samples.

34. Whose 95% confidence interval for mean height is more likely to be wider?
- A. Amy's 95% confidence interval
 - B. Bob's 95% confidence interval
 - C. There is no reason to expect Amy's 95% confidence interval to be wider or thinner than Bob's 95% confidence interval
35. Which one of the following statements is correct?
- A. Compared to the mean height in Amy's sample, the mean height in Bob's sample will certainly be farther from the true mean height among the population of ISU students.
 - B. Compared to the mean height in Amy's sample, the mean height in Bob's sample will probably be farther from the true mean height among the population of ISU students.
 - C. Compared to the mean height in Amy's sample, the mean height in Bob's sample is just as likely to be farther from the true mean height among the population of ISU students as the mean height in Bob's sample is to be closer to the true mean height among the population of ISU students.

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36. Suppose that, in a randomized experiment, the mean response from participants in the control group differs from the mean response from participants in the treatment group. One reason for this is that participants in the control group were treated differently than participants in the treatment group were treated. The other possible reason why the mean response from participants in the control group differed from the mean response from participants in the treatment group is ____.
- A. a ceiling effect
 - B. Simpson's paradox
 - C. random assignment error**
 - D. regression toward the mean

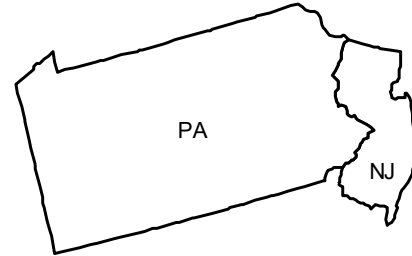
[Item 37, 38] U.S. residents who live in an apartment have fewer children on average than U.S. residents who live in a house have, with a p-value of $p < 0.05$ for a test of the null hypothesis that the mean number of children among U.S. residents who live in an apartment is equal to the mean number of children among U.S. residents who live in a house. Compared to living in a house, living in an apartment might cause people to have fewer children, because apartments have less space for children to live. But provide a different plausible reason why U.S. residents who live in an apartment have fewer children on average than U.S. residents who live in a house have.

There are many acceptable responses for this item. For example, maybe people who live in an apartment are on average younger, and maybe (compared to older people) younger people are less likely to have had their full set of children so far. Or maybe people who have children tend to move from an apartment to a house, so that the association is because the number of children affects the type of residence people have.

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[Item 39, 40] The passage below is from a famous study, "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania" by David Card and Alan B. Krueger, published in the American Economic Review:

On April 1, 1992, New Jersey's minimum wage rose from \$4.25 to \$5.05 per hour. To evaluate the impact of the law we surveyed 410 fast-food restaurants in New Jersey and eastern Pennsylvania before and after the rise. Comparisons of employment growth at stores in New Jersey and [eastern] Pennsylvania (where the minimum wage was constant) provide simple estimates of the effect of the higher minimum wage...We find no indication that the rise in the minimum wage reduced employment.



Card and Krueger could have compared stores in New Jersey to stores across the entire state of Pennsylvania. Explain the advantage of comparing stores in New Jersey to stores only in the eastern part of Pennsylvania.

New Jersey borders the eastern part of Pennsylvania, so -- on most characteristics -- New Jersey is plausibly more similar to the eastern part of Pennsylvania than to the entire state of Pennsylvania. Comparing regions that are similar to each other, except for the characteristic of interest (a change in the minimum wage in this case), helps address the alternate explanation that any difference in outcome is due to a characteristic other than the characteristic of interest.

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[Item 41, 42] Researchers can use lottery winners to estimate the effect of wealth, because winning a lottery is random, and, at the time of the lottery, the set of people who play the lottery and win the lottery is similar to the set of people who play the lottery and lose the lottery.

Suppose that, in a fictional country, married persons have more wealth than unmarried persons have.

Explanation 1 for this pattern is that more wealth,

on average, causes a person to be more likely to get married (maybe, for instance, more wealth makes a person more attractive as a spouse). **Explanation 2** for this pattern is that being married causes a person to accumulate more wealth (maybe, for instance, because a married person on average has more children and works more hours or saves more of their income to help support the children).

Person	Year	Wealth Jan 1	Won Lottery?	Married or unmarried?	Wealth Dec 31
A	1	\$0	Lost	Unmarried	\$0
A	2	\$0	Lost	Unmarried	\$0
A	3	\$0	Lost	Unmarried	\$0
B	1	\$0	Lost	Unmarried	\$0
B	2	\$0	Lost	Married	\$10,000
B	3	\$10,000	Lost	Married	\$20,000
C	1	\$0	Lost	Unmarried	\$0
C	2	\$0	Won	Unmarried	\$100,000
C	3	\$100,000	Won	Unmarried	\$200,000
D	1	\$500,000	Lost	Married	\$500,000
D	2	\$500,000	Lost	Married	\$500,000
D	3	\$500,000	Lost	Married	\$500,000

The table has data for four persons (A through D) in three years (1, 2, 3), indicating that person's wealth on January 1 of a year, whether the person won the lottery that year, whether the person was married that year, and that person's wealth on December 31 of that year. In this country, the only lottery is held January 1, and the winners receive the lottery winnings on January 2. And, in this country, people can get married only on July 1. Indicate whether the table data better match Explanation 1 or Explanation 2. Then explain why that explanation is a better match to the data.

Person A and Person D did not win the lottery or change their marital status, so these persons can't help with a cross-time analysis. Person C won the lottery, increased their wealth, but remained unmarried; therefore, for Person C higher wealth did not cause marriage. Person B got married and then increased their wealth; therefore, the data for Person B is consistent with marriage causing higher wealth. Therefore, overall, these data better match Explanation 2.