

POL 138 Quantitative Reasoning in Political Science

Practice Exam 2

Completing this practice exam is not worth points toward your POL 138 grade, but it might be useful to take the practice exam and check your responses against the key. Content on Exam 2 should closely match content on Practice Exam 2, but with potentially different ways of measuring understanding of concepts, such as if short answer items are converted to multiple-choice items or vice versa, or if understanding of a concept is measured a different way.

5 The problem of alternate explanations

5.1 Correlations

1. 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 correlation
 - B. an inference
 - C. a percentile
 - D. a standard deviation

2. If the numbers in X increase as the numbers in Y increase, then that is a ___ between X and Y.
 - A. positive correlation
 - B. negative correlation
 - C. zero correlation

3. If the numbers in X increase as the numbers in Y decrease, then that is a ___ between X and Y.
 - A. positive correlation
 - B. negative correlation
 - C. zero correlation

4. If the numbers in X decrease as the numbers in Y decrease, then that is a ___ between X and Y.
 - A. positive correlation
 - B. negative correlation
 - C. zero correlation

5. If the numbers in X do not change as the numbers in Y increase, then that is a ___ between X and Y.
 - A. positive correlation
 - B. negative correlation
 - C. zero correlation

5.2 Alternate explanations

6. Suppose that data indicated that political knowledge was higher on average among political science majors than among education majors, with a p-value of $p < 0.05$ for a test of the null hypothesis that these means equal each other. Is this sufficient evidence to conclude at the conventional level in political science that being a political science major caused a higher level of political knowledge than being an education major did, at least on average?
 - A. Yes, because the p-value is $p < 0.05$, and it makes sense that political science classes would cause higher levels of political knowledge than education classes would.
 - B. No, because the analysis did not address alternate explanations such as the possibility that, even before these students entered their majors, political knowledge was higher among students who planned to major in political science than among students who planned to major in education.
7. Suppose that data from a large nationally representative sample of U.S. residents indicated that U.S. residents who reported being sexually harassed at work were more likely to report being a Democrat than to report being a Republican. Explain whether this is sufficient evidence to conclude that, at least on average and among this sample of U.S. residents, being sexually harassed at work caused a person to be more likely to report being a Democrat than to report being a Republican.
8. The SAT is a test that some colleges use to determine whether to admit a student. Some states require all students in that state to take the SAT during school on an "SAT School Day", and the state pays for all students to take the SAT. But some states don't require any students to take the SAT, although, in these states, students are permitted to take the SAT, and these students often take the SAT on the weekend and pay for the SAT on their own. Data for the SAT in 2022 indicated that the mean SAT math score was 577 for students who took the SAT on the weekend, but was 451 for students who took the SAT on SAT School Day. The p-value is $p < 0.01$ for a test of the null hypothesis that these scores equal each other. Discuss whether this is sufficient evidence at the conventional level in political science that, compared to taking the SAT on SAT School Day, taking the SAT on the weekend caused students to do better on the SAT, at least on average.
9. Data from our POL 138 class indicated that, on average, the number of class meetings a student attended positively associated with the student's score on Exam 2, with a p-value of $p < 0.05$ for a test of the null hypothesis that the number of class meetings a student attended did not associate with the student's score on Exam 2. It is possible that this positive association was because students attending more class meetings on average caused students to score higher on Exam 2, because students learned while in class. But provide a different plausible reason why the number of class meetings a student attended positively associated with the student's score on Exam 2.

6 Randomized experiments

6.1 Randomized experiments

10. Which one of these is NOT a necessary step in a randomized experiment involving human participants?
 - A. Treat each group differently.
 - B. Randomly assign participants to groups.
 - C. Use control variables to eliminate alternate explanations.
 - D. Measure some outcome for each group.

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

12. 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. 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

13. 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

14. 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

15. 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

[Items 16 and 17] A researcher randomly selects 200 people from a population and then randomly assigns 100 of these people to a group that receives Treatment A and randomly assigns the other 100 people to a group that receives Treatment B.

16. The random assignment to groups ____.
- A. better permits the researcher to make an inference about the population
 - 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
17. The random selection from the population ____.
- A. better permits the researcher to make an inference about the population
 - 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

18. Suppose that researchers have a sample in which 50 persons are randomly assigned to watch Video A and 50 persons are randomly assigned to watch Video B. Both videos encourage people to donate blood, and the only difference between the videos is that Video A ends with the narrator saying "Please donate blood" and Video B ends with the narrator saying "Please donate blood, for the children". After watching the video, each participant is asked to donate blood.

Suppose that exactly 10 of the 50 persons who watched Video A donated blood after being asked to donate blood (20%) and that exactly 20 of the 50 persons who watched Video B donated blood after being asked to donate blood (40%). The p-value is $p<0.05$ for a test of the null hypothesis that these percentages equal each other. Explain whether this is sufficient evidence at the conventional level in political science to conclude that the "for the children" at the end of Video B caused the difference between groups in the percentage of persons who donated blood.

19. Suppose that, in a correctly conducted 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. Indicate 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.

20. Randomly assigning participants to groups in an experiment helps to reduce a certain kind of bias that might occur if participants were able to select whether they wanted to be in the control group or the treatment group. Explain how randomly assigning participants to groups helps eliminate this bias.
21. Bob wants to test whether a pill causes weight loss, so he assigns a randomly selected set of 1,000 U.S. residents to take the pill each morning for ten weeks. Results indicated that the mean weight of the participants decreased over the ten weeks of the study ($p < 0.001$). Based on this evidence, can we conclude at the conventional level in political science that the pill caused the weight loss among these participants, at least on average?
- A. Yes
 - B. No

6.2 Placebos

22. 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

6.3 Natural experiments

23. 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.

7 Non-random comparisons

7.1 Discontinuity designs

24. Faber College offers POL 100 each Monday and Wednesday in four sections, with start times of 8am, 11am, 2pm, and 6pm. Each class meeting is 1 hour and 15 minutes long. Lunch at Faber College is from 12:30pm to 1:30pm. Students are randomly assigned to sections of POL 100. For each section, students take a pretest and a posttest to measure their learning over the semester. Researchers are interested in the effect of eating lunch on learning. Researcher A plans to compare the average student learning across the two sections before lunch (8am and 11am) to the average student learning across the two sections after lunch (2pm and 6pm). Researcher B plans to instead compare the average student learning in the 11am section to the average student learning in the 2pm section. An advantage of Researcher B's research design over Researcher A's research design is that ____.
- A. Researcher B will avoid Simpson's paradox
 - B. Researcher B will have a smaller sample size
 - C. Researcher B will address an alternate explanation
 - D. Researcher B will avoid bias due to regression toward the mean
25. In the United States in the 1930s, the U.S. government sponsored the Home Owners' Loan Corporation, which created maps. On these maps, certain areas were colored green, blue, yellow, or red, to indicate the perceived mortgage lending risk in these areas. The areas that were colored red were considered to be the riskiest areas to lend to, and the areas that were colored green were considered the least risky areas to lend to. The process of assigning geographic regions to the red area is called "redlining".

For areas that were redlined on these maps in the 1930s, economic outcomes are on average relatively poor in modern times: for example, in 2016, the percentage of residents who were low-to-moderate income was 9% for the green areas, but 74% for the red areas. The p-value is $p < 0.05$ for a test of the null hypothesis that the modern-day percentage of residents in the green areas who are low-to-moderate income equals the modern-day percentage of residents in the red areas who are low-to-moderate income. Explain whether this is sufficient evidence at the conventional level in political science that the "redlining" maps in the 1930s caused this modern-day difference between residents in the green areas and residents in the red areas in the percentage of persons who are low-to-moderate income.

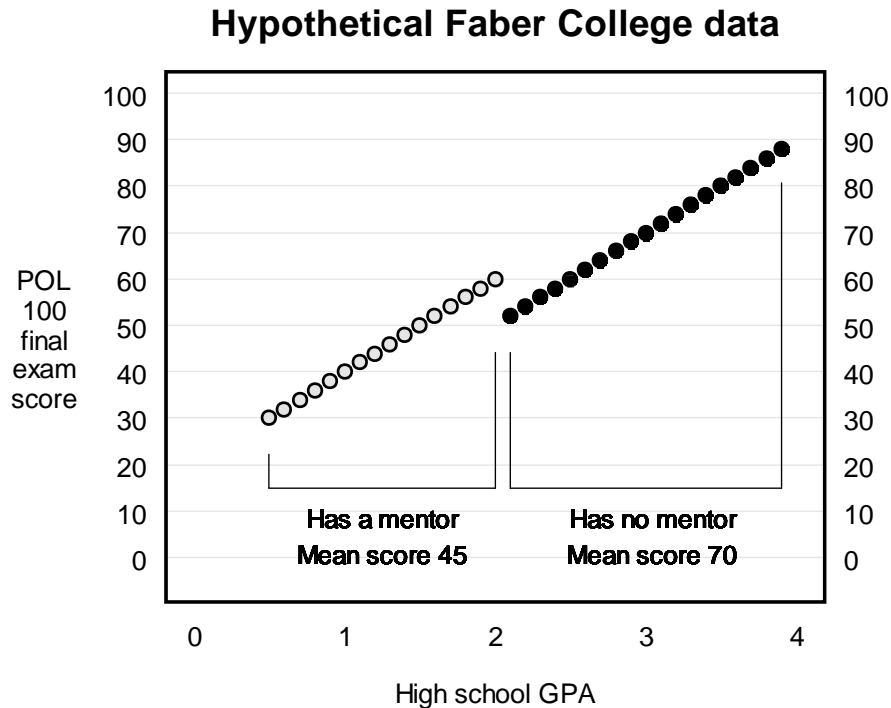
26. Regarding the redlining discussed in the prior item, Aaronson et al 2018 reported on an analysis that limited comparisons to edges between colored regions, to, for example, compare [1] outcomes for residents who live in a redlined area but who live near the edge of that redlined area to [2] outcomes for residents who live right across the street from that redlined resident but who live in a greenlined area.

For the purpose of estimating whether redlining has had a negative effect on modern-day outcomes for people living in redlined areas, explain an advantage of limiting comparisons to the edges between redlined areas and greenlined areas, instead of comparing outcomes for all residents of redlined areas to outcomes for all residents of greenlined areas.

27. Suppose that — based on a student's SAT or ACT score, the student's current GPA, the student's frequency of class attendance, and the rigor of the student's major — a university calculates an "academic risk" score that predicts each student's risk of dropping out of the university. Based on this academic risk score, the university divides its 20,000 students into 100 groups of 200 students each, in which students in Group 1 have the highest academic risk score, which means that these students are predicted to have the highest risk of dropping out; students in Group 2 have the next highest academic risk score, and so on, with students in Group 100 having the lowest academic risk index score, which means that these students are predicted to have the lowest risk of dropping out. The university provides to each student in Groups 1 through 50 — and only to these students — a University Academic Mentor who communicates with the student at least once per week and provides other academic support.

The university is interested in determining a research design for assessing the effect of the University Academic Mentor on student dropout rates. Researcher A suggests that the dropout rate for students in Groups 1 through 50 (in which all students were assigned a University Academic Mentor) be compared to the dropout rate for students in Groups 51 through 100 (in which no student was assigned a University Academic Mentor). Researcher B suggests that the dropout rate for students in Groups 49 and 50 be compared to the dropout rate for students in Groups 51 and 52. Explain an advantage of Researcher B's research design over Researcher A's research design.

[Items 28 and 29] 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.



28. Suppose that we (incorrectly) estimate the effect of having a mentor on a student's POL 100 final exam score, by comparing how much the mean final exam score among students who had a mentor differs from the mean final exam score among students who did not have a mentor. Which of the following best indicates that (incorrect) estimate?
- The mentor reduced final exam scores by about 25 points, on average.
 - The mentor reduced final exam scores by about 10 points, on average.
 - The mentor did not affect final exam scores, on average.
 - The mentor increased final exam scores by about 10 points, on average.
 - The mentor increased final exam scores by about 25 points, on average.
29. Suppose that we instead 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 (more plausible) estimate?
- The mentor reduced final exam scores by about 25 points, on average.
 - The mentor reduced final exam scores by about 10 points, on average.
 - The mentor did not affect final exam scores, on average.
 - The mentor increased final exam scores by about 10 points, on average.
 - The mentor increased final exam scores by about 25 points, on average.

7.2 Difference-in-differences designs

30. Suppose that, at Faber College, enrollment in the political science major increased 2% each year from 2012 to 2017. In 2018, the political science department got a new department chair, and, over the next five years, enrollment increased at only 1%. 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 increased at 1% per year from 2012 to 2017
 - B. the sociology major at Faber College, in which enrollment increased at 2% per year from 2012 to 2017
 - C. the economics major at Faber College, in which enrollment increased at 2% per year from 2018 through 2022

[Items 31 and 32] 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 10 for extremely conservative.

Group	Mean ideology at age 18	Mean ideology at age 22
Persons in college	4.5	3.5
Persons not in college	5.0	4.2

31. If the researcher analyzed only the data for persons in college, the researcher's (incorrect) estimate of the effect of college on political ideology would be that college ____.
- A. made persons in the sample about 0.2 units more liberal on average
 - B. made persons in the sample about 0.8 units more liberal on average
 - C. made persons in the sample about 1.0 unit more liberal on average
 - D. made persons in the sample about 3.5 units more liberal on average
32. If the researcher used a difference-in-differences design that compared persons in college to persons not in college, the researcher's (more correct) estimate of the effect of college on political ideology would be that college ____.
- A. made persons in the sample about 0.2 units more liberal on average
 - B. made persons in the sample about 0.8 units more liberal on average
 - C. made persons in the sample about 1.0 unit more liberal on average
 - D. made persons in the sample about 3.5 units more liberal on average

33. 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	6%	6%	6%	3%
Oceania	6%	6%	6%	3%

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.
34. Suppose that unemployment in Freedonia was 12% in 2021, 12% in 2022, and 12% in 2023, and then, on January 1, 2024, Freedonia enacted the Unemployment Reduction Act. Unemployment was then 6% in 2024. Researchers are interested in assessing the extent to which the Unemployment Reduction Act caused this decrease in the unemployment rate. Oceania and Pacifica are countries next to Freedonia and are similar to Freedonia in many ways, but neither Oceania nor Pacifica enacted any legislation to reduce unemployment.

	Unemployment Rate			
	2021	2022	2023	2024
Freedonia	12%	12%	12%	6%
Oceania	14%	14%	14%	14%
Pacifica	10%	10%	10%	10%

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 likely the reason for the decrease in unemployment in Freedonia between 2023 and 2024.
- B. The Unemployment Reduction Act was likely not the reason for the decrease in unemployment in Freedonia between 2023 and 2024.

7.3 Benchmarks

35. Membership in the Pi Sigma Alpha national political science honors society requires, among other things, at least a 3.0 GPA. Suppose that we are interested in estimating the effect, if any, that membership in Pi Sigma Alpha has had on the future income of college graduates. Researcher A plans to compare future income among any college students who were in Pi Sigma Alpha to future income among any college students who were not in Pi Sigma Alpha. Researcher B instead plans to compare future income among any college students who were in Pi Sigma Alpha and had a 3.0 GPA to future income among any college students who were not in Pi Sigma Alpha and had a 3.0 GPA. Which researcher has the better research design for estimating the effect, if any, that membership in Pi Sigma Alpha has on the future income of college graduates?
- A. Researcher A, because Researcher A will have a much larger sample size and thus a more precise estimate of the effect, if any, that membership in Pi Sigma Alpha has on future income.
- B. Researcher B, because Researcher B's comparison will better isolate the effect of membership in Pi Sigma Alpha, because both of Researcher B's groups will be students of similar academic ability.
36. Researchers are interested in assessing whether the percentage of women among U.S. political science professors is unfairly too high or too low due to gender bias among the people who hire political science professors. Researcher A plans to compare the percentage of women among U.S. political science professors to the percentage of women among all U.S. residents. Researcher B instead plans to compare the percentage of women among U.S. political science professors to the percentage of women among U.S. residents who have a Ph.D. in political science. Explain why Researcher B's suggested benchmark might be better than Researcher A's suggested benchmark.

7.4 Panel designs

37. 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

38. Suppose that, for two participants, a researcher has data from a survey in January and another survey in December of the same year, with each participant appearing twice in the dataset. 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	January	December
1	D + Oppose	R + Oppose
2	R + Support	D + Support

- 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

8 Statistical control

8.1 Statistical control

39. How do control variables help improve causal inference in a correlational study?
- A. reduce bias in measurements
 - B. remove sample bias
 - C. help address alternate explanations
 - D. randomly assign participants
40. 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
41. In a non-experimental analysis, including a control variable that should not be included ____.
- A. can bias an estimated effect to be too low but cannot bias an estimate to be too high
 - B. can bias an estimated effect to be too high but cannot bias an estimate to be too low
 - C. can bias an estimated effect to be too low and can bias an estimate to be too high
 - D. cannot bias an estimated effect to be too low and cannot bias an estimate to be too high
42. Suppose that you were asked to conduct a study to determine whether male ISU employees are paid more than female ISU employees are paid. For each ISU employee, you have data on the employee's salary and their gender. Using these salary data as the outcome, would you need control variables for this study?
- A. Yes
 - B. No

43. Suppose that you were asked to conduct a study to determine whether male ISU employees are unfairly paid more than female ISU employees are paid. For each ISU employee, you have data on the employee's salary and their gender. Using these salary data as the outcome, would you need control variables for this study?
- A. Yes
B. No
44. Suppose that, at a certain university, all students must complete an internship. Some students choose to do the internship during the summer, and some students choose to do the internship during the fall or spring. Suppose that we wanted to assess whether completing the internship during the summer causes a student to be more likely or less likely to get a job within a year of graduation, compared to completing the internship during the fall or spring. One problem for our analysis is that the type of student who completes an internship during the summer might differ from the type of student who completes an internship during the fall or spring, and that difference might affect the likelihood that the student gets a job within a year of graduation. Indicate a control variable that can help address this concern, and explain why that control variable can help address this concern.
45. Suppose that you are assigned to test the hypothesis that a female candidate having long hair (compared to having short hair) will affect the percentage of votes that the female candidate receives. For a large set of female candidates, you have data on the percentage of votes that the female candidate received in their election and data on whether that female candidate had long hair or short hair in that election. [1] Identify a control variable that you could use for the analysis. [2] Then explain how that particular control variable would help improve the analysis.

[Items 46 and 47] Below are data on the salary and experience of four male teachers and three female teachers.

Teacher	Gender	Salary	Experience	Teacher	Gender	Salary	Experience
1	Male	50	Low	5	Female	50	Low
2	Male	90	High	6	Female	50	Low
3	Male	90	High	7	Female	90	High
4	Male	90	High				

46. Calculate the gender gap in mean salary, to the nearest dollar, between the mean salary of the four male teachers and the mean salary of the three female teachers.
47. Compared to the gender gap in mean salary when not controlling for experience, indicate whether the gender gap in mean salary when controlling for experience would be larger, smaller, or the same size.

[Items 48 and 49] The table below contains information about six police officers.

Officer	Does the Officer Wear a Body Camera?	Officer Gender	Citizen Complaints about the Officer	Officer	Does the Officer Wear a Body Camera?	Officer Gender	Citizen Complaints about the Officer
1	Yes	Female	6	4	No	Female	12
2	Yes	Female	6	5	No	Male	18
3	Yes	Male	12	6	No	Male	18

48. Based on the table data and to one decimal place, what is the average gap in the mean number of citizen complaints about police officers, between police officers who wore a body camera and police officers who did not wear a body camera?
49. Based on the table data, statistical control for the gender of the police officer makes the body cameras seem ___ at reducing citizen complaints about an officer, compared to an analysis of the data without any statistical control.
- A. less effective
 - B. as effective
 - C. more effective

[

Items 50 and 51] The table below contains information about six police officers.

Officer	Does the Officer Wear a Body Camera?	Officer Age	Citizen Complaints about the Officer
1	Yes	20	20
2	Yes	20	20
3	Yes	40	10
4	No	20	30
5	No	40	20
6	No	40	20

50. Based on the table data and to one decimal place, what is the average gap in the mean number of citizen complaints about police officers, between police officers who wore a body camera and police officers who did not wear a body camera?
51. Based on the table data, statistical control for the age of the police officer makes the body cameras seem ___ at reducing citizen complaints about an officer, compared to an analysis of the data without any statistical control.
- A. less effective
 - B. as effective
 - C. more effective

52. Data below are from six employees of a company.

Employee	Gender	Pay	Hours Worked
1	Male	\$40	40
2	Male	\$40	40
3	Male	\$20	20

Employee	Gender	Pay	Hours Worked
4	Female	\$30	40
5	Female	\$10	20
6	Female	\$10	20

Based on these data and to the nearest penny, what is the gender gap in mean pay among these six employees when controlling for the number of hours worked?

- A. \$0.00
 - B. \$10.00
 - C. \$16.67
 - D. \$20.00
53. Data below are from eight employees of a different company.

Employee	Gender	Pay	Hours Worked	Employee	Gender	Pay	Hours Worked
1	Male	\$30	40	5	Female	\$30	40
2	Male	\$10	20	6	Female	\$10	40
3	Male	\$10	20	7	Female	\$10	20
4	Male	\$10	20	8	Female	\$10	20

Based on these data, with no statistical control, the mean pay is \$15 among the four male employees and is \$15 among the four female employees. Controlling for only the number of hours worked would suggest that ____.

- A. there is no gender gap in mean pay
- B. there is a gender gap in mean pay that disadvantages male employees on average
- C. there is a gender gap in mean pay that disadvantages female employees on average

8.2 Multiple linear regression

[Items 54 and 55] Suppose that researchers are interested in testing whether respondent marital status influences their ratings about the #MeToo movement. The first linear regression below uses data from the ANES 2020 Time Series Study to predict respondent ratings about the #MeToo movement (FTMETOO), using a predictor for respondent marital status. The second linear regression adds a predictor for respondent age.

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. reg FTMETOO i.MARITAL
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FTMETOO	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
(intercept)	55.8	0.5	108.32	0.000	54.8	56.8
MARITAL						
Widowed	1.8	1.6	1.12	0.264	-1.3	4.9
Divorced	4.7	1.1	4.24	0.000	2.5	6.9
Separated	5.2	2.9	1.78	0.075	-0.5	11.0
Never married	9.9	0.9	10.65	0.000	8.1	11.8

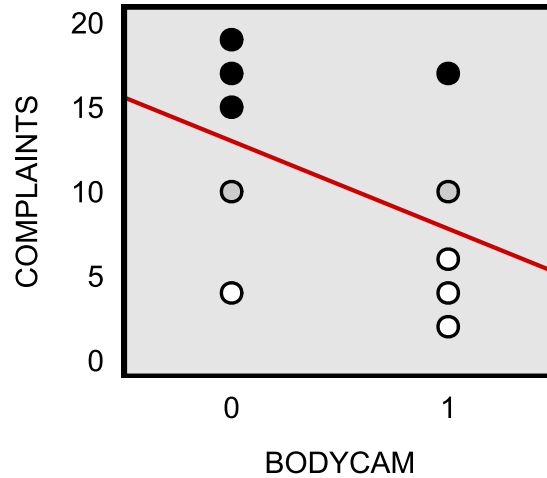
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. reg FTMEETOO i.MARITAL AGE
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FTMETOO	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
(intercept)	64.2	1.5	42.20	0.000	61.2	67.2
MARITAL						
Widowed	4.1	1.7	2.44	0.015	0.8	7.5
Divorced	5.1	1.1	4.48	0.000	2.9	7.3
Separated	5.0	3.0	1.67	0.096	-0.9	10.8
Never married	7.3	1.0	7.01	0.000	5.2	9.3
AGE						
AGE	-0.1	0.0	-5.61	0.000	-0.2	-0.1

54. Which of the following better indicates the correct interpretation of the 4.1 coefficient for the "Widowed" category in the second regression?
- The predicted difference in FTMETOO between a widowed respondent and a married respondent.
 - The predicted difference in FTMETOO between a widowed respondent and a married respondent, controlling for respondent age.
55. Explain a benefit of the second regression controlling for respondent age.

8.3 Illustration of the effects of statistical control

56. The plot below reports on the x-axis whether the police officer wears a body camera (0 for No, and 1 for Yes) and on the y-axis the number of complaints received by a police officer. The color of the points indicates the officer's age, with black being age 20, gray being age 30, and white being age 40. The slope of the line in the plot is the association between X and Y without any controls, suggesting that the body camera associates with 5.2 fewer complaints on average.



- If we predict complaints using the bodycam variable and a control for the age of the officer, that analysis will suggest that the body camera associates with ____.
- A. 5.2 fewer complaints on average
 - B. less than 5.2 fewer complaints on average
 - C. more than 5.2 fewer complaints on average