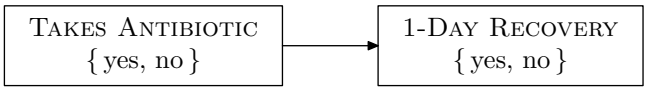
Philosophy 12: Introduction to Causal Reasoning
Causation to Unconditional Association study questions

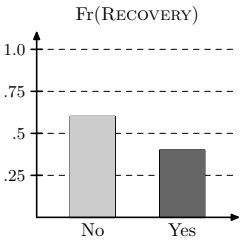
For each of the following statements, indicate whether the statement *directly* states a claim about causation or directly states a claim only about association.

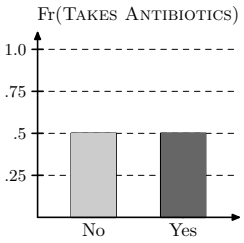
1. People who eat a lot of garlic get just as many colds as people who don't.
   (a) Causation
   (b) Association
2. Bathing one's self in media violence brings out aggressive tendencies.
   (a) Causation
   (b) Association
3. 40% of all Americans have broken the law at some time in their adult life. 53% of Americans who gre up with only a mother have broken the law at some time.
   (a) Causation
   (b) Association
4. Capital punishment does not deter hardened criminals.
   (a) Causation
   (b) Association
5. Suppose we have the variable Takes Antibiotics with values { yes, no }, and the variable 1-Day Recovery with values { yes, no }. The causal graph we hypothesize to hold among these two variables is:

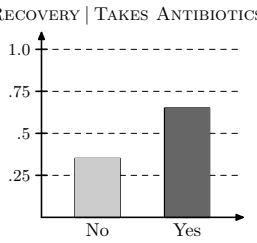


   What does it mean to say that this causal hypothesis produces an association between Takes Antibiotics and 1-Day Recovery? (Pick the best answer.)
   (a) On average, more people will have 1-day recoveries.
   (b) The frequency of 1-day recovery is the same as the frequency of 1-day recoveries among those who take antibiotics.
   (c) The frequency of 1-day recoveries is higher than the frequency of 1-day recoveries among those who take antibiotics.
   (d) The frequency of 1-day recoveries is not the same as the frequency of 1-day recoveries among those who take antibiotics.

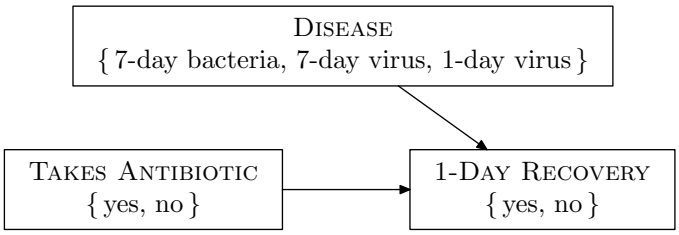
6. Which of the following histograms should you examine to determine whether there is a positive association between taking antibiotics and recovering in one day?

(a)


(b)


(c)


7. Suppose the following causal graph describes the real deterministic system underlying the causal hypothesis discussed in question 5:



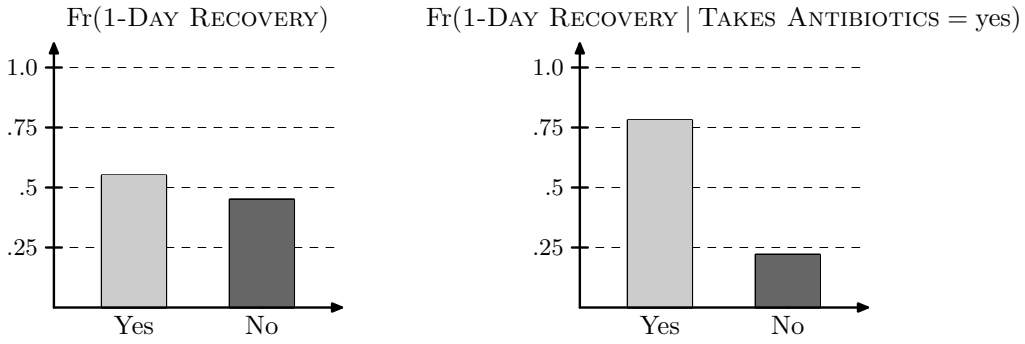
Here is the response structure for the system:

Assignment	Takes Antibiotics	Disease	1-Day Recovery
1	Yes	7-day bacteria	Yes
2	No	7-day virus	No
3	Yes	1-day virus	Yes
4	No	7-day bacteria	No
5	Yes	7-day bacteria	No
6	No	1-day virus	Yes

Which two causal assignments justify including an edge from Takes Antibiotic to 1-Day Recovery?

(a) 1
(b) 2
(c) 3
(d) 4
(e) 5
(f) 6

8. Consider the following histograms:

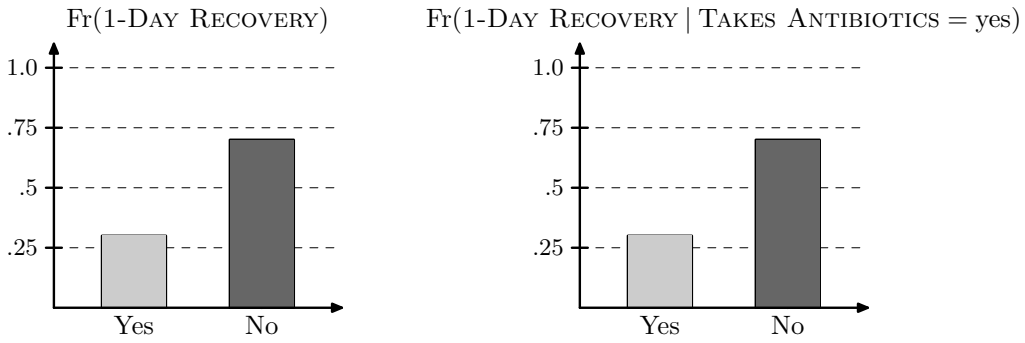


Is Taking Antibiotics associated with 1-Day Recovery?

(a) Yes

(b) No

9. Consider the following histograms:

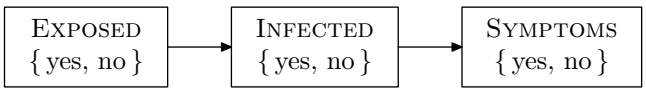


Is Taking Antibiotics associated with 1-Day Recovery?

(a) Yes

(b) No

10. Consider the following causal graph:



Which of the following are correct? Exposed is...

(a) ... a direct cause of Symptoms.

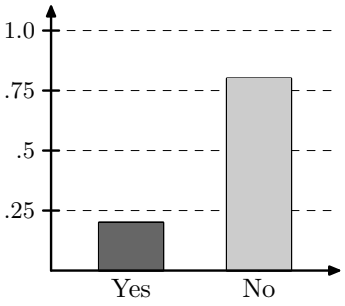
(b) ... a cause of Symptoms.

(c) ... an indirect cause of Symptoms.

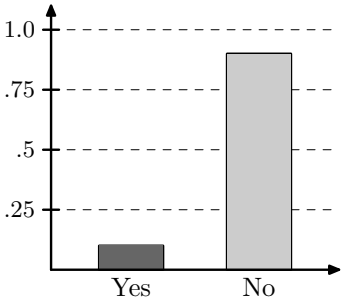
(d) none of the above

11. Which of the following histograms should you examine to determine whether there is an association between Exposed and Symptoms?

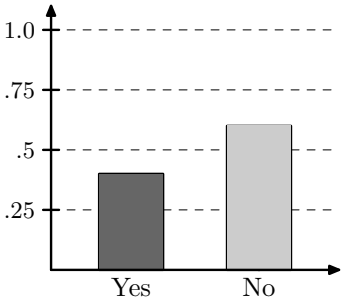
(a)



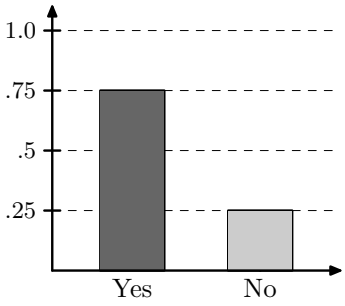
(b)



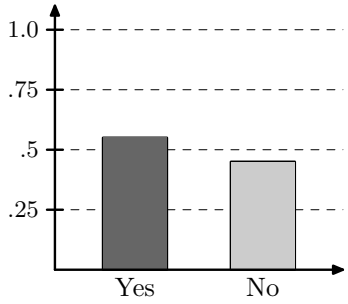
(c)



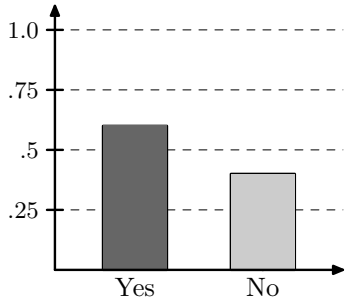
(d)



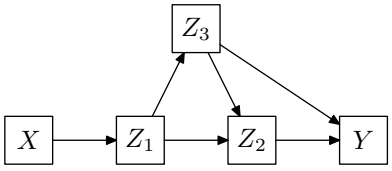
(e)



(f)



12. Consider the causal graph below:



Which of the following are causal paths?

(a) $X \to Z_1 \to Z_2 \to Y$

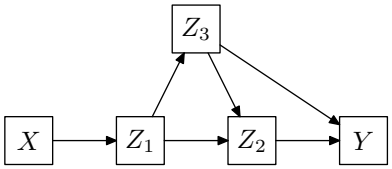
(b) $X \to Z_1 \to Z_3 \to Y$

(c) $X \to Z_1 \to Z_2 \leftarrow Z_3 \to Y$

(d) $X \to Z_1 \to Z_3 \to Z_2 \to Y$

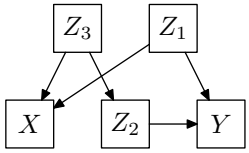
13. Create a graph in which there are three distinct causal paths from X to Y, each involving exactly two direct causes.

14. In the graph below, which pairs of variables have a direct common cause? (Circle all that apply.)



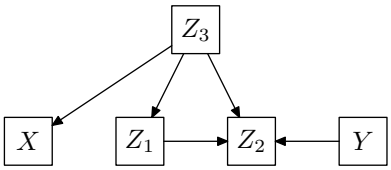
(a) Z_1 and Z_2
(b) Z_2 and Z_3
(c) Z_2 and Y
(d) Z_1 and Y
(e) Z_3 and Y

15. In the causal graph below, how many common causes of X and Y are there?



(a) 0 (b) 1 (c) 2 (d) 3

For questions 17– 19, consider the following graph:



17. Which of the following pairs are causally connected?

(a) Z_1, Z_2
(b) Z_1, Z_3
(c) Z_1, Y
(d) Z_2, Z_3
(e) Z_2, Y
(f) Z_3, Y

18. How many causal connections are there between X and Y?

(a) 0 (b) 1 (c) 2 (d) 3 (e) 4

19. How many causal connections are there between Z_1 and Z_2?

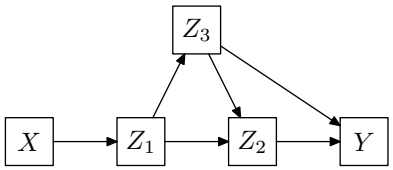
(a) 0 (b) 1 (c) 2 (d) 3 (e) 4

For questions 20–22, consider the following contingency table:

	Blond Smoker	Blond Non-Smoker	Dark-Haired Smoker	Dark-Haired Non-Smoker	Totals
Male	5	5	2	8	20
Female	8	2	5	5	20
Totals	13	7	7	13	40

20. In the above table:
    (a) Hair Color and Smokes are associated.
    (b) Hair Color and Smokes are independent.
21. In the above table:
    (a) Sex and Smokes are associated.
    (b) Sex and Smokes are independent.
22. In the above table:
    (a) Hair Color and Sex are associated.
    (b) Hair Color and Sex are independent.

For questions 23–26, consider the following graph:



For each candidate path below, categorize it as a directed path or not.

23. $X \to Z_1 \to Z_2 \to Y$
24. $X \to Z_1 \to Z_3 \to Y$
25. $X \to Z_1 \to Z_2 \leftarrow Z_3 \to Y$
26. $X \to Z_1 \to Z_3 \to Z_2 \to Y$