



Bookmarks

- ▶ [Module 1: The Basics of R and Introduction to the Course](#)
- ▶ [Entrance Survey](#)
- ▶ [Module 2: Fundamentals of Probability, Random Variables, Distributions, and Joint Distributions](#)
- ▶ [Module 3: Gathering and Collecting Data, Ethics, and Kernel Density Estimates](#)
- ▶ [Module 4: Joint, Marginal, and Conditional Distributions & Functions of Random Variable](#)

Module 8: Causality, Analyzing Randomized Experiments, & Nonparametric Regression > Causality > The Selection Problem - Quiz

## The Selection Problem - Quiz

🔖 Bookmark this page

### Question 1

1.0 point possible (graded)

Suppose that there are two students, John and Mary. John is assigned to be in the treatment group and Mary in the control group. The treatment is a tutoring program, where John will work with a one-on-one tutor for three hours each week. Mary receives no extra tutoring.  $Y_M$  refers to the Mary's test scores and  $Y_J$  to John's,  $T$  is a dummy variable that takes on the value **1** if the person is in the treatment group and **0** if the person is in the control group. In this example, which of the following states of the world are directly observed? (Select all that apply.)

☒ a.  $Y_M | T = 0$

☐ b.  $Y_M | T = 1$

☐ c.  $Y_J | T = 0$

☒ d.  $Y_J | T = 1$



Explanation

- ▶ [Module 5: Moments of a Random Variable, Applications to Auctions, & Intro to Regression](#)
- ▶ [Module 6: Special Distributions, the Sample Mean, the Central Limit Theorem, and Estimation](#)
- ▶ [Module 7: Assessing and Deriving Estimators - Confidence Intervals, and Hypothesis Testing](#)
- ▼ [Module 8: Causality, Analyzing Randomized Experiments, & Nonparametric Regression](#)

**Causality**

due Nov 21, 2016 05:00 IST

**Analyzing Randomized Experiments**

due Nov 21, 2016 05:00 IST



In this set up, we only observe Mary's test scores in the case where she does not receive treatment, and we only observe John's test scores in the case where he does receive treatment.

Submit

You have used 2 of 2 attempts

✓ Correct (1/1 point)

**Question 2**

1.0 point possible (graded)

Which of the following expressions captures the effects that we would ideally like to be able to measure?

- ☐ a.  $(Y_M|T = 1)$  and  $(Y_J|T = 1)$
- ☐ b. Only  $(Y_J|T = 1)$ , since John is the only one assigned to the treatment group
- ☒ c.  $(Y_M|T = 1) - (Y_M|T = 0)$  and  $(Y_J|T = 1) - (Y_J|T = 0)$  ✓
- ☐ d.  $(Y_J|T = 1) - (Y_M|T = 1)$  and  $(Y_J|T = 0) - (Y_M|T = 0)$

**Explanation**

**Use of Randomization and Nonparametric Regression**

due Nov 21, 2016 05:00 IST



**Module 8: Homework**

due Nov 14, 2016 05:00 IST



► **Module 9: Single and Multivariate Linear Models**

► **Exit Survey**

Ideally, we would like to be able to calculate the difference between test scores for each person in the case where they are assigned to the treatment group and in the case where they are assigned to the control group, or  $(Y_M|T = 1) - (Y_M|T = 0)$  and  $(Y_J|T = 1) - (Y_J|T = 0)$ . By definition, we do not observe the counterfactual outcomes (the case where Mary is assigned to the treatment group,  $Y_M|T = 1$ , and the case where John is assigned to the control group  $Y_J|T = 0$ ).

Submit

You have used 1 of 2 attempts

✓ Correct (1/1 point)

### Question 3

1.0 point possible (graded)

Now suppose that you have a large set of children that are randomly assigned to either the treatment or control group. Which of the following expresses the “treatment effect on the treated” for a given outcome  $Y$ ? For simplicity, let  $T$  refer to  $T = 1$  (those assigned to the treatment group) and  $C$  refer to  $T = 0$  (those assigned to the control group).

☐ a.  $E[Y_i^T|T] - E[Y_i^C|C]$

☒ b.  $E[Y_i^T|T] - E[Y_i^C|T]$  ✓

☐ c.  $E[Y_i^C|T] - E[Y_i^C|C]$

- ☐ d.  $E[Y_i^T | T] - E[Y_i^C | T] + E[Y_i^C | T] - E[Y_i^C | C]$

### Explanation

$E[Y_i^T | T] - E[Y_i^C | T]$  represents the treatment effect that we would like to be able to calculate, that is, outcomes in the case where the treatment group received the treatment (which we observe) compared to outcomes in the case where the same treatment group would not have received the treatment (which is the counterfactual, and cannot be observed).

Submit

You have used 1 of 2 attempts

✓ Correct (1/1 point)

### Question 4

1/1 point (graded)

Which of the following correctly describes selection bias?

- ☐ a. The bias that is introduced when researchers select which outcomes to measure and include in econometric models
- ☒ b. There could be underlying differences between those in the treatment and those in the control groups ✓

- ☐ c. Treatment effects are different across individuals in the treatment group

### Explanation

The selection effect refers to the fact that there could be underlying differences between those assigned to the treatment group and those assigned to the control group. In other words, treatment alone is not the only difference between the two groups. By using the control group outcome as the counterfactual for the treatment group, this would lead to bias in estimating the treatment effect.

Submit

You have used 1 of 1 attempt

---

✓ Correct (1/1 point)

### Discussion

Topic: Module 8 / The Selection Problem - Quiz

Show Discussion

© All Rights Reserved



© 2016 edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open EdX logos are registered trademarks or trademarks of edX Inc.

