## Congratulations! You passed!

**Grade received** 100% **To pass** 80% or higher

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1. Given the following statistical information of patients for a treatment arm and a control group, which one corresponds to a correct setup of a randomized control trial? 1 / 1 point

| | Treatment Arm | Control Group |
|---|---|---|
| Age | Mean= 55, Std = 9 | Mean= 50, Std = 3 |
| Systolic BP | Mean= 134, Std = 10.1 | Mean= 132, Std = 9.2 |

| | Treatment Arm | Control Group |
|---|---|---|
| Age | Mean= 60, Std =5.1 | Mean= 59, Std = 5. 5 |
| Systolic BP | Mean= 140, Std = 10.3 | Mean= 139, Std = 10.1 |

| | Treatment Arm | Control Group |
|---|---|---|
| Age | Mean= 61, Std = 6.7 | Mean= 60, Std = 6.1 |
| Systolic BP | Mean= 120, Std = 9.2 | Mean= 140, Std = 4.9 |

| | Treatment Arm | Control Group |
|---|---|---|
| Age | Mean= 30, Std = 7.1 | Mean= 40, Std = 7.5 |
| Systolic BP | Mean= 120, Std = 9.2 | Mean= 140, Std = 4.9 |

Correct

This is an example of a correctly randomized control trial.

2. You are part of a medical team trying to create an alternative treatment for patients with lung cancer. Your group performs several experiments and reports results with the following p-values. Which has the most statistically significant result? **1 / 1 point**

- ○ p-value = 0.001
- ○ p-value = 0.0003
- ○ p-value = 0.5
- ◉ p-value = 0.0001

**Correct**
Great job! A small p-value is proved that the result is statistically significant.

3. Given an average risk reduction (ARR) of 0.2, on average, how many people need to receive the treatment in order to benefit one of them (NNT)? **1 / 1 point**

- ◉ 5
- ○ 10
- ○ 20
- ○ 0.8

**Correct**
Correct! With this treatment, we would have to treat 5 people in order to benefit one of them.

4. You are studying the effect of a new treatment for heart attack, your job consists in looking at outcomes of the effect in patients, fill the unit level treatment effect column using the Neyman-Rubin causal model, and then *calculate the average treatment effect.* **1 / 1 point**

Tips:

- The event doesn't occur: 0
- The event occurs: 1
- Unit Level Treatment Effect: -1 represents a benefit, 0 represents no effect, 1 represents harm.

| ID | Yi(1)<br>Outcome Given Treatment | Yi(0)<br>Outcome When not Given Treatment | Yi(1) - Y(0)<br>Unit Level Treatment Effect |
|---|---|---|---|
| 1 | 0 | 1 | |
| 2 | 1 | 0 | |
| 3 | 1 | 1 | |
| 4 | 0 | 0 | |
| 5 | 1 | 0 | |

| | | | |
|---|---|---|---|
| 6 | 1 | 1 | |
| 7 | 1 | 0 | |
| 8 | 1 | 0 | |

- (●) 0.375
- ( ) -0.75
- ( ) 0.75
- ( ) -0.375

**Correct**

Correct! Here is the full table using the Neyman-Rubin causal model:

| ID | Yi(1)<br>Outcome Given Treatment | Yi(0)<br>Outcome When not Given Treatment | Yi(1) - Y(0)<br>Unit Level Treatment Effect |
|---|---|---|---|
| 1 | 0 | 1 | -1 |
| 2 | 1 | 0 | 1 |
| 3 | 1 | 1 | 0 |
| 4 | 0 | 0 | 0 |
| 5 | 1 | 0 | 1 |
| 6 | 1 | 1 | 0 |
| 7 | 1 | 0 | 1 |
| 8 | 1 | 0 | 1 |
| Avg | 0.75 | 0.375 | 0.375 |

**5.** Calculate the conditional average treatment effect applying the Two-Tree Learner method, the patient has an Age=61 and BP= 130. **1 / 1 point**

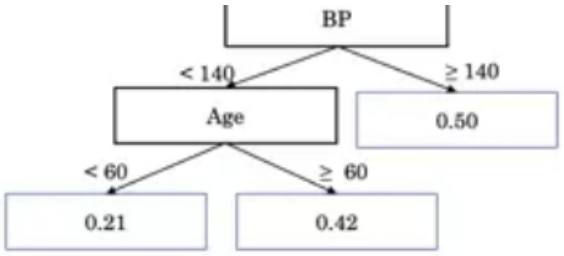
$\hat{\mu}_1(x)$ is the treatment response function.

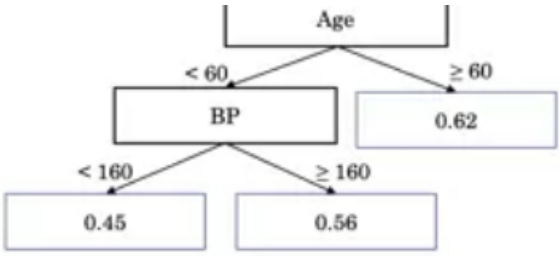
$\hat{\mu}_0(x)$ is the control response function.

$$\mathbb{E}[Y_i(1) - Y_i(0) \mid X = x]$$

$$\mathbb{E}[Y_i \mid W = 1, X = x] - \mathbb{E}[Y_i \mid W = 0, X = x]$$

$$\hat{\mu}_1(x) \qquad\qquad \hat{\mu}_0(x)$$

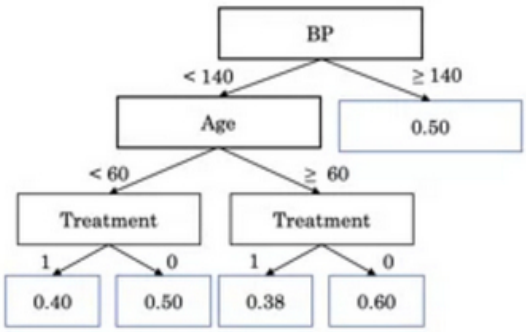



- 0.43
- 0.24
- -0.20
- -0.24

**Correct**
Correct!

**6.** Using the S-Learner, or Single Tree, method, what is the conditional average treatment effect for a 61 year-old patient with a blood pressure (BP) of 140? **1 / 1 point**




- 0.02
- 0.22
- We can't estimate the conditional ATE using this S-Learner.
- 0.10

**Correct**
Correct! This model is not considering the treatment variable for this case.

**7.** Which considerations are relevant to the S-Learner Method? Choose all that are correct. **1 / 1 point**

- [x] This model might produce a treatment effect estimate of 0 for everyone.

Correct

Correct! The model could be good at estimating the risk with and without treatment, predicting the same risk for both of them, therefore the difference in these two expected outcomes would be 0.

- [ ] Since the two models are using each half of the data, there are fewer samples available to learn the relationships between the features.
- [ ] Your model is more likely to overfit your data.
- [x] The Decision Tree might decide not to use the treatment feature.

Correct

8. Which considerations are relevant to the T-Learner Method? Choose all that are correct. **1 / 1 point**

- [ ] Your model is more likely to overfit your data.
- [ ] This model might produce a treatment effect estimate of 0 for everyone.
- [ ] The Decision Tree might decide not to use the treatment feature.
- [x] Since the two models are using each half of the data, there are fewer samples available to learn the relationships between the features.

Correct

Correct! We need to have enough data available if we decide to use the T-Learner method.