Quiz: Measuring Treatment Effects

TOTAL POINTS 8

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= 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= 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= 30 , Std = 7.1	Mean= 40 - Std = 7.5
Systolic BP	Mean= 120 - Std = 9.2	Mean= 140 - Std = 4.9

	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

✓ **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 the following results, which one of them has a better statistically significant result?

1 / 1 point

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

3. Given the following (average risk reduction) ARR = 0.2, how many people need to receive the treatment in order to benefit one of them (NNT)?

1 / 1 point

- ◉ 5
- ○ 10
- ○ 20
- ○ 0.8

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) Outcome Given Treatment	Yi(0) Outcome When not Given Treatment	Yi(1) - Y(0) 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) Outcome Given Treatment	Yi(0) Outcome When not Given Treatment	Yi(1) - Y(0) 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.

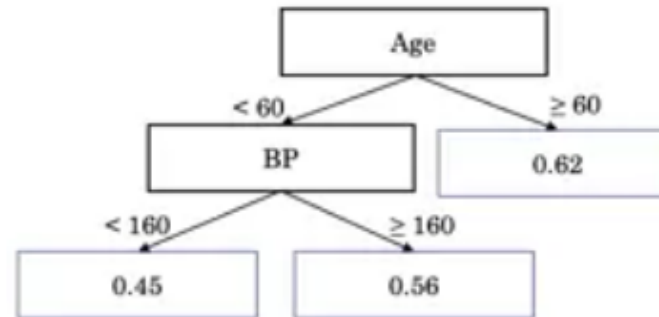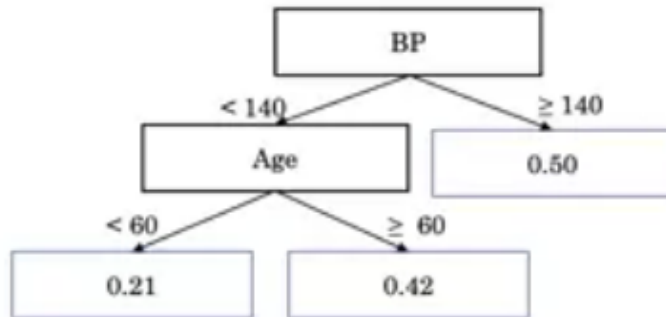$\hat{\mu}_1(x)$ is the treatment response function.

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

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

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

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

$\hat{\mu}_1(x)$ tree:
- BP
  - < 140 → Age
    - < 60 → 0.21
    - ≥ 60 → 0.42
  - ≥ 140 → 0.50

$\hat{\mu}_0(x)$ tree:
- Age
  - < 60 → BP
    - < 160 → 0.45
    - ≥ 160 → 0.56
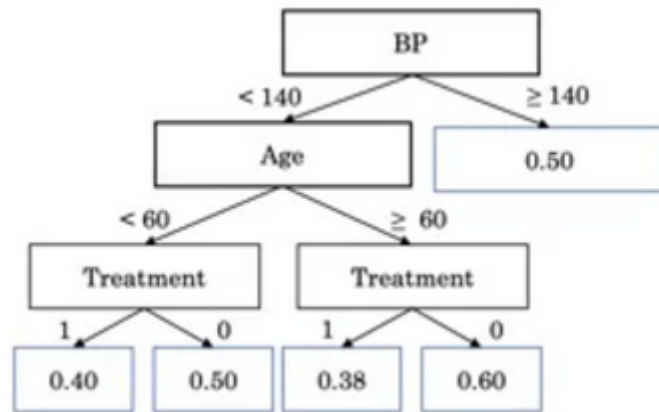 - ≥ 60 → 0.62

- ○ -0.24
- ◉ -0.14
- ○ 0.24
- ○ 0.43

✓ **Correct**
Correct!

6. Calculate the conditional average treatment effect applying the Single Tree method, the patient has an Age=61 and BP= 140.

1 / 1 point

○ 0.10

◉ We can't estimate the conditional ATE using this S-Learner.

○ 0.22

○ 0.02

✓ **Correct**

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

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7. What considerations we need to have if we want to use the S-Learner Method?   **0.5 / 1 point**

☑ The Decision Tree might decide not to use the treatment feature.

✓ **Correct**

☑ Since the two models are using each half of the data, there are fewer samples available to learn the relationships between the features.

> ❗ **This should not be selected**
>
> This is a consideration for the T-Learner.

☑ This model would 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.

☑ Your model is more likely to overfit your data.

> ❗ **This should not be selected**
>
> Not particularly.

8. What considerations we need to have if we want to use the T-Learner Method?   0 / 1 point

☑ The Decision Tree might decide not to use the treatment feature.

> ❗ **This should not be selected**
>
> This is a consideration for the S-Learner.

☑ 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.

☑ This model would produce a treatment effect estimate of 0 for everyone.

! This should not be selected

This is a consideration for the S-Learner.

☑ Your model is more likely to overfit your data.

! This should not be selected

Your model is more likely to overfit your data.