hw5

1

a

Identify the ATE under conditional ignorability:

$$
\begin{aligned}
E[Y(1) - Y(0)] &= E\Big[E[Y(1) \mid X]\Big] - E\Big[E[Y(0) \mid X]\Big] \qquad \text{iterated expectation} \\
&= E\Big[E[Y(1) \mid X,\ D = 1]\Big] - E\Big[E[Y(0) \mid X,\ D = 0]\Big] \qquad \text{CI}
\end{aligned}
$$

b

2

a

```
library(tidyverse)
dgp_p2 <- function(n) {
  tibble(
    x1 = rnorm(n, 0, 1),
    x2 = rchisq(n, 1),
    prob_D = exp(0.5*x1 + 0.5*x2 - 0.5)/(1 + exp(0.5*x1 + 0.5*x2 - 0.5)),
    D = rbinom(n, 1, prob_D),
    prob_Y = exp(0.6*x1 + 0.2*x2 + 0.5*x1*x2)/(1 + exp(0.6*x1 + 0.2*x2 + 0.5*x1*x2)),
    Y = rbinom(n, 1, prob_Y)
  ) %>%
    select(-prob_D, - prob_Y)
}
```

```r
sim <- function(n) {
  data <- dgp_p2(n)
  dim <- lm(Y ~ D, data)$coefficients[2]
  mod_y <- glm(Y ~ x1 + x2 + x1*x2, data, family = "binomial")
}
```