MY457: Problem Set 2

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1 R Markdown

You must submit your problem set solutions as a .pdf. We strongly recommend that you use `R Markdown`, which allows you to integrate R code and your own writing/commentary into a single reproducible document. This specific template is set up as a `Bookdown` document written to .pdf. You should click the **Knit** button in `RStudio` to produce the .pdf document. The majority of your code should appear **only** in the code appendix at the end of the document. The main part of your document should be written text, plus tables, plots, and occasionally code chunks where relevant (e.g. if you write a particular function you want to discuss in detail).

1 Concepts 1.1 The notation $(Y_1, Y_0) \perp D|X$ means that the potential outcomes (Y_1, Y_0) are independent of the treatment D conditional on the covariates or pre-treatment variable X, also called the conditional independence assumption. It does not mean that (Y_1, Y_0) are independent from all X. In a sense, we make a little mini-experiment with the conditional independence assumption by saying that every observation that has the same X, the same pre-treatment, we assume that they also get the same D, may it be treatment or control. This is a strong assumption, because it means that we assume that e.g. people with the same characteristics (the same X) are put into the same treatment group (the same D), regardless of other factors that might influence their treatment.This could lead to a selection bias, and it is a form of confounding. For example, if we are interested in the effect of a job training program on earnings, we might expect that the potential earnings of a person who receives the training (Y_1) are different from the potential earnings of a person who does not receive the training (Y_0), even after controlling for the person's characteristics X.

2 Code appendix

```
# this chunk contains code that sets global options for the entire .Rmd.
# we use include=FALSE to suppress it from the top of the document, but it will still appear in the app
knitr::opts_chunk$set(echo=FALSE, warning=FALSE, message=FALSE, linewidth=60)

# you can include your libraries here:
library(tidyverse)

# and any other options in R:
options(scipen=999)

# this chunk generates the complete code appendix.
# eval=FALSE tells R not to re-run (``evaluate'') the code here.
```