Exercises (PS1)

a)

It is the non-treated potential outcome for subject i.

b)

$Y_i(0) \mid D_i = 1$ denotes the untreated potential outcome for at unit i who would have been treated under a *hypothetical* allocation of treatment.

In contrast $Y_i(0) \mid d_i = 1$ is the untreated potential outcome for at unit I who *actually* receives the treatment.

c)

$Y_i(0)$ is the non-treated potential outcome for subject i. In contrast $Y_i(0) \mid Di = 0$ is the untreated potential outcome for at unit I who under a hypothetical allocation, would not be treated.

d)

They are both non-treated potential outcomes, but they differ in whether or not they would be treated under a hypothetical allocation of treatment.

e)

$E[\, Y_i(0)] = $ Expectet value of non-treated potential outcome when one subject is sampled at random. General expectation.

$E[\, Y_i(0)] \mid$ Di=1. Conditional expectation. Expected value of non-treatment among the subjects who would be treated under a hypothetical allocation of treatment.

f)

Because when Di is randomly assigned this holds:

$E[\, Y_i(0)] \mid$ Di=1 $= E[\, Y_i(0)] \mid$ Di=0

The potential outcomes would be the same, thereby eliminating selection bias.

2.10

a) Handing out letters is something separate than treatment that vary. This can break the assumption, that treatment and control have the same potential outcomes. It is hard to know whether the effect is a cause of treatment or a bi-product of the letter-hand-out. You could expect the treatment to have larger effect on political interest because selectionsbias. The treatment would be likely to find others ways to increase their political interest as an independent effect of the letter-hand-out.

b)

Non-interference. It is possible that the control group will be treated thereby violating the potential outcome-assumption. You would likely underestimate the true causal effect, because there would be effects of treatment on the control-group as well. This would thereby be negative:

$$E[\ Y_i(0)]\ |\ Di=1 - E[\ Y_i(0)]\ |\ Di=0$$

2.12

a)

There a big self-selection problem which violates the assumption that potential outcomes is uncorrelated with treatment. This could both be due to reverse-causality and confounders which are both correlated with treatment and outcome. For example the more educated inmates are probably less violent and at the same time better readers. You could imagine that you would be able to do a better guess on who has received treatment if you knew the inmates' potential outcomes.

b)

You could argue that the excludability assumption is violated if youre causal-argument is, that the reading itself, would make the inmates less criminal. There can be other positive bi-products of isolating inmates 3 hours a day, which would make them less criminal, regardless of whether they were reading or not. But if youre argument about reading contains isolation, then the excludability assumption is complied.

c)

You could imagine that the reading would inspire the non-treated to read more as well (Transmission). The consequence of this would be, that the control-group would be treated as well.