Exercises week 5.

1. Use the following data

	X	C	Y	n
1	0	0	0	80
2	0	0	1	20
3	0	1	0	20
4	0	1	1	10
5	1	0	0	80
6	1	0	1	20
7	1	1	0	80
8	1	1	1	40

a. Calculate the probability to be treated for those with C=1 and those with C=0.
   - P(X=1| C=c) for c=0,1

   What are these probabilities?

The propensity score values for those with C=0 and C=1 are

P(X=1| *C=1*)=120/150=0.8

P(X=1| *C=0*)=100/200=0.5

b. Suppose you want to adjust for confounding by calculating propensity score weights. Calculate the weights for X=1,0 and C=1,0

   - The weights for X=0,1, C=0,1

X=1, C=1: 1/0.8=1.25 X=0, C=1: 1/(1-0.8) = 5

X=1, C=0: 1/0.5=2 X=0, C=0: 1/0.5=2

	X	C	weight	Y	n
1	0	0	2	0	80
2	0	0	2	1	20
3	0	1	5	0	20
4	0	1	5	1	10
5	1	0	2	0	80
6	1	0	2	1	20
7	1	1	1.25	0	80
8	1	1	1.25	1	40

- Estimate $E\big(Y(x)\big)$, for x=0,1

$\hat{E}[Y(1)] = \frac{80*0*2+20*1*2+80*0*1.25+40*1*1.25}{80*2+20*2+80*1.25+40*1.25}$= 90/350= 0.26

$\hat{E}[Y(0)] = \frac{20*2+10*5}{80*2+20*2+20*5+10*5}$= 90/350

- Estimate the ATE (risk difference)

Again the ATE= 0.

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b. Try to derive what the weights would be if you would want to estimate the treatment effect in the treated .

The treated will all get weight 1 because interest is in the subgroup of treated.

For the untreated, the standard weights are multiplied by the probability to be treated. That is

$$\frac{P(X=1|C)}{P(X=0|C)}$$