HW2

1. Compare the backdoor criterion and traditional statistical approach for identifying confounders. In what case, the traditional method would lead mistake? Think how to fix the traditional definition of confounders.

2. Describe the sufficient-component cause model (i.e. sufficient cause, component cause, necessary cause...) and give an example of how it works.

3. Below is a description of TrustVic.csv :

   - y_trust: Generalized trust (0-10) at 2006 (Outcome)
   - x_threat: Experiencing a threat (0,1) in year before 2006 (Treatment)
   - c_age: Age measure at 2005
   - c_male: Gender at 2005 (Male=1, Female=0)
   - c_education: Level of education (0-10) at 2005
   - c_income: Income categorical (0,1,2,3) at 2005

   We wish to know whether victimization has causal effect on generalized trust. Please follow the instructions below to do the investigation. R (recommended) and Python are accepted for coding. All codes and results should be submitted in HTML and packaged with the answer for Q1&2 into a compressed zip file.

   (a) Simply check the relationship between trust and victimization (without and with potential confounders).

   (b) Properly estimate the propensity score for victimization, and visualize the distribution of propensity score in treatment and control.

   (c) Use the propensity score calculated in (b) to do matching (one-to-one) and calculate the average causal effect.

   (d) Use the propensity score calculated in (b) to do weighting and calculate the average causal effect.