Ekaterina Kazak **ECON61001: Econometric Methods** Semester 1

Programming Assignment # 7.

Please complete the following problems and submit a file named `PA7.R`.

Remember:

- Do not use global paths in your script. Instead, use `setwd()` interactively in the console, but do not forget to remove or comment out this part of the code before you submit. The directory structure of your machine is not the same as the one on Gradescope's virtual machines.
- Do not destroy or overwrite any variables in your program. I check them only after I have run your entire program from start to finish.
- Check to make sure you do not have any syntax errors. Code that doesn't run will get a very bad grade.
- Do not install or require any libraries unless specified in the task.
- Make sure to name your submission `PA7.R`

Tip: before submitting, it might help to clear all the objects from your workspace, and then `source` your file before you submit it. This will often uncover bugs. Before you start, install and load the library `wooldridge`. You can use the function `install.packages()` for installation and `library(wooldridge)` to load the library. Please outcomment installation code and only leave the library loading line.

We are interested in estimating a causal effect of garbage incinerator on the local house prices. For that we use the data from the paper by K.A. Kiel and K.T. McClain (1995),"House Prices During Siting Decision Stages: The Case of an Incinerator from Rumor Through Operation," Journal of Environmental Economics and Management 28, 241-255. We are interested in the relationship between real prices `rprice` and the location of the incinerator `nearinc`.

Note, using the function `help(kielmc)` you can access the detailed variable description. Do not forget to outcomment this line before you submit your code.

Variable	Definition
`rprice`	real price of a house in 1978 dollars
`nearinc`	=1 if distance to incinerator is less than 15840 ft., = 0 else
`year`	1978 or 1981
`y81`	=1 if year is 1981, = 0 else
`y81nrinc`	y81*nearinc

1. Using the Wooldridge library, import the data `kielmc` as a data frame with the name `df`.

2. Define a subsample of `df` for the 1978. For that define a data frame `df_78`, which has observations on real prices (column 1) and the dummy `nearinc` (column 2) for the data from 1978 only.

3. Define a subsample of `df` for the 1981. For that define a data frame `df_81`, which has observations on real prices (column 1) and the dummy `nearinc` (column 2) for the data from 1981 only.

4. Estimate the linear regression $rprice = \beta_0 + \beta_1 \cdot nearinc + u$ using 1978 data. Save the vector of estimated coefficients as `b_78`.

5. Calculate the average real price of a house which was near incinerator in 1978. Save it under `mun78`.

6. Calculate the average real price of a house which was not near incinerator in 1978. Save it under `mu78`.

7. Calculate the difference in the average real prices between those houses which were near incinerator and those houses which were sufficiently far away in 1978. Save the difference as `delta_78`.

8. Estimate the linear regression $rprice = \beta_0 + \beta_1 \cdot nearinc + u$ using 1981 data. Save the vector of estimated coefficients as `b_81`.

9. Calculate the average real price of a house which was near incinerator in 1981. Save it under `mun81`.

10. Calculate the average real price of a house which was not near incinerator in 1981. Save it under `mu81`.

11. Calculate the difference in the average real prices between those houses which were near incinerator and those houses which were sufficiently far away in 1981. Save the difference as `delta_81`.

12. Calculate the difference in difference estimator for the causal effect of garbage incinerator on real house prices as a difference between `delta_81` and `delta_78`. Save it as `delta1`.

13. Estimate the linear regression $rprice = \beta_0 + \beta_1 \cdot y81 + \beta_2 \cdot nearinc + \beta_3 \cdot y81nrinc + u$ using data for both 1978 and 1981. Save the vector of estimated coefficients as `beta`.

14. You are now interested whether the effect of a garbage incinerator on the house prices is significantly negative. For that you would like to test the hypothesis $H_0 : \beta_3 \geq 0$ against $H_1 : \beta_3 < 0$. Calculate the appropriate test statistic and save it under `tstat`.

15. Using the Student-t distribution, find out the appropriate critical value for the hypothesis $H_0 : \beta_3 \geq 0$ against $H_1 : \beta_3 < 0$ and save it under the name `cv`. Save the corresponding p-value as `pvalue`.

16. Define a variable `reject` which takes a logical `TRUE` if the null hypothesis $H_0 : \beta_3 \geq 0$ is rejected and a logical `FALSE` if there is not enough evidence to reject the null.