Homework Assignment 1

*For this homework assignment that comprises **10% of your final grade**
you will need to work in groups of <u>two</u> or <u>three people</u>. Each group will need
to hand in one solution: one member of the group will need to send the
following materials by email to **tilenbaeva_n@auca.kg** and put his/her
group-mates in the copy of the email:*

- *Pdf file with screenshots of Stata outputs, interpretation of results,
  answers to the questions, etc.*

- *Do-file containing commands used to answer the questions.*

*Please make sure to indicate the name(s) of your group members in both
documents. Please note that all the solutions need to be typed, so please
allow enough time for typing the solutions out. No handwritten solutions
will be accepted.*

***Deadline** for submission is: **23 October 2022, 23:59**. If you submit
your assignment <u>after the deadline</u>, the maximum you can get for your work
will be the following:*

- *1-5 minutes late: 8%*

- *6-59 minutes late: 7%*

- *60 minutes-24 hours late: 5%*

- *after 24 hours: 0%*

1 Ordinary Least Squares (OLS) Estimation

(37 points)

1. Import the Stata data file `"wages"` from the e-course platform.

2. **(2 points)** Run the linear regression given by

   $wages = \beta_0 + \beta_1 education + \beta_2 workexp + \beta_3 unionmember + \beta_4 south + \beta_{5-9} occupation + \beta_{10} female + u$

where

`wages`=hourly wage in US dollars;

`education`=years of schooling;

`workexp`=years of work experience;

`unionmember`=a dummy variable equal to "1" if a person is a union member, and "0" otherwise;

`south`=a dummy variable equal to "1" if a person lives in the south, and "0" otherwise;

`occupation`=a categorical variable equal to "1" if a person's occupation is "management"; "2" if it is "sales"; "3" if it is "clerical", "4" if it is "service", "5" if it is "professional" and "6" if it is "other". Please make sure to use "other" as the base category;

`female`=a dummy variable equal to "1" if a person is female, and "0" if a person is male.

3. **(5 points)** Interpret the OLS coefficients (intercept and slope coefficients). When doing it, make sure to discuss the sign of the coefficient, its magnitude and ceteris-paribus interpretations, as well as statistical significance of the coefficients.

4. **(2 points)** What is the estimated effect on `wages` if a person engages in part-time one-year master degree studies, while working at the same time?

5. **(2 points)** How do you interpret the R-squared obtained from running this regression?

6. **(2 points)** Without running any additional tests, what can you say about the joint significance of all independent variables in the model? Which statistic(s) helps you to answer this question?

7. **(10 points)** Test the null hypothesis $H_0 : \beta_1 = \beta_2$ against the alternative $H_1 : \beta_1 < \beta_2$ at 1% significance level. *Hint 1:* consult the appropriate chapter in Wooldridge regarding the procedure to do this type of test. *Hint 2:* you will need to define a new parameter and rearrange the equation to get all the needed statistics for hypothesis-testing. What do the results suggest?

8. **(5 points)** Test the null hypothesis $H_0 : \beta_3 = 0, \beta_4 = 0$ against the alternative $H_1 : H_0$ *is not true* at 1% significance level. Perform the test by running restricted and unrestricted models. What do the results suggest?

9. **(2 points)** Run the linear regression given by

   $log(wages) = \beta_0 + \beta_1 education + \beta_2 workexp + \beta_3 unionmember + \beta_4 south + \beta_{5-9} occupation + \beta_{10} female + u$

10. **(7 points)** Interpret the OLS coefficients (intercept and slope coefficients). When doing it, make sure to discuss the sign of the coefficient, its magnitude and ceteris-paribus interpretations, as well as statistical significance of the coefficients. First, discuss the approximate marginal effects. Next, calculate and discuss the exact marginal effects.