Simulation – Due: Monday, Dec 12 - 5pm

Use the dataset simulate2.dta.

DO NOT USE THE 'CLARIFY' SOFTWARE PACKAGE TO DO THIS ASSIGNMENT. You may of course find the clarify package helpful to check your results!

Produce clean, well-documented code for the appropriate sections below, and submit it with your problem set.

The following is the true model:

\[ Y_{2i} = \beta_0 + \beta_1 * X_{1i} + \beta_2 * X_{2i} + \epsilon_i \]  

(1)

1) Estimate the model with the dataset simulate2.dta.

2) Compute analytically the expectation of \( Y_2 \) given \( X_1 = 1, X_2 = 2 \).

2b) Compute analytically a 95% confidence interval about your answer in (2).

3) Now, compute a 95% confidence interval for the expectation of \( Y_2 \) given \( X_1 = 1, X_2 = 2 \) by drawing 1000 values from the estimated distribution of the parameters of the model.

4) Now, compute a 95% confidence interval for the expectation of \( Y_2 \) given \( X_1 = 1, X_2 = 5 \) by drawing 1000 values from the estimated distribution of the parameters of the model.

5) Now, compute a 95% confidence interval for the change in the expectation of \( Y_2 \) when \((X_1,X_2)\) goes from \((1,2)\) to \((1,5)\).

6) How are your answers in (3), (4), and (5) related?