

Bayesian Econometrics Homework 1

Professor Sang-Sub Lee
Due on February 4 (12:00 PM)

January 28th, 2019

Do the followings in R and submit the program and output.

Problem 1. Download and install R and R-Studio from <https://cran.r-project.org> and <https://www.rstudio.com/products/rstudio/download/>

Problem 2 Use R to calculate the followings:

1. Create a vector called x containing the number 2 5 8 12 16
2. Create a vector called y containing the number from 5 to 9
3. Calculate $z = x - y$

Problem 3.

1. Create a vector x of 100 values starting at 2 and increasing by 3 each time
2. Extract the values at positions 5,10,15 and 20 in the vector of values from x
3. Extract the values at positions 10 to 20.
4. Create 25 by 4 matrix $x3$ from x (first 4 elements go to the first row, next 4 elements go to 2nd row, etc.)
5. Create 25 by 2 matrix from 2nd and 3rd column of matrix $x3$.

Problem 4

1. Save a tap delimited file, called `sample_file.txt` in a directory and set your working directory to where your data is stored. Then read the file into a new structure using `read.delim` command and check (print) the row 11.
2. Calculate the mean of the column named `Length`.
3. Find out how many rows in `sample_file` have a `Length` which is < 65 .

4. Print the values of Length less than 65.

Problem 5.

1. Generate a sequence of x variable from 0 to 10 by 0.5 increment.
2. Generate $y_i = 2 + 3 * x_i + e_i$ where $e_i \sim i.i.d.N(0, 3^2)$.
3. Plot x and y.
4. Fit a linear regression model for y on x using command lm
5. Draw the fitted regression line.

Problem 6.

1. Draw a sample of 100 observations from gamma distribution with shape parameter =1 and rate parameter=4.
2. calculate the mean and compare with the theoretical mean.
3. Draw histogram and density of the sample

Problem 7. Generate 1000 observations of an AR process and draw graphs:

1. generate a standard normal random variable for the initial value x_1 .
2. for x_i from i=2 to 1000, $x_i = .09 * x[i - 1] + e_i$ where $e_i \sim i.i.d.N(0, 1)$
3. plot x and cumulative sum of x (use command cusum) over i