problem-set-01

August 17, 2018

0.0.1 SP-6534 Economia Computacional

1 Problem set 1

1.0.1 Instrucciones

- **Fecha de entrega: 29 de agosto de 2018**
- Resuelva los siguientes problemas, tomados del libro de Miranda and Fackler.
- Cambie el nombre del archivo: al nombre original agregue un guión y su número de carné, e.g. problem-set-01-A98765
- Envíe este archivo con las respuestas al asistente del curso.

1.1 Problem 1.

Plot the function $f(x) = 1e^{2x}$ on the interval $[1, 1]$ using a grid of evenly spaced points 0.01 units apart. Hint: you will need `numpy.exp` and `numpy.arange` for the computations, and `matplotlib.pyplot.plot` for plotting.

1.2 Problem 2.

Consider the matrices

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 1 & 4 \\ 2 & 7 & 3 \end{bmatrix} \tag{1}$$

and

$$B = \begin{bmatrix} -7 & 1 & 1 \\ 7 & 3 & -2 \\ 3 & 5 & 0 \end{bmatrix} \tag{2}$$

and the vector

$$y = \begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix} \tag{3}$$

1.2.1 a.

Formulate the standard matrix product $C = AB$, and solve the linear equation $Cx = y$. What are the values of C and x? Hint: you will need `numpy.array` to declare the matrices, and `np.linalg.solve` to solve the system. Matrix multiplication is done with the `@` symbol.

1.2.2 b.

Formulate the element-by-element matrix product $C = AB$, and solve the linear equation $Cx = y$. What are the values of C and x? Hint: Element-by-element multiplication is done with the `*` symbol.

1.3 Problem 3.

Using the Numpy standard normal pseudo–random number generator `numpy.random.randn`, simulate a hypothetical time series $\{y_t\}$ governed by the structural relationship $y_t = 5 + 0.05t + \epsilon_t$ for years $t = 1960, 1961, \ldots, 2001$, assuming that the ϵ_t are independently and identically distributed with mean 0 and standard deviation 0.2. Using only Numpy elementary matrix operations, regress the simulated observations of y_t on a constant and time, then use Matplotlib to plot the actual values of y and estimated trend line against time.

1.3.1 Reference

Miranda and Fackler 2002 Applied Computational Economics and Finance