Assignment 1

Remarks regarding homework:

In an effort to maintain my sanity, I'd like you to follow the following conventions when submitting homework:

1. Archive (zip) your HW and upload it with filename"Simulation_HW_5 _Radamel_Falcao" (or .rar, .tar, whatever). I find 7-Zip to be a useful program for doing so, but there are plenty of other methods. Please note that there are not spaces...

2. In the archive, one file should be a script called "RunMeInPython" (or similar) that will create whatever plots or outputs the HW asks for when run. That script might contain a single line calling another script or function, or it might have the entire HW in it. Either way, all I should need to do is run it. If you go nuts on some assignments and run your code for hours, the RunMe script should include variable selections that can complete in a few minutes as a proof of concept, as well as commented out (or otherwise indicated) variable selections that duplicate your results.

3. Everything needed to make the code work should be in the archive. For example, if the HW gives you data to read in and manipulate, the file containing that data should be included in the archive.

4. The expected output (plots, numerical results) **should be clearly labeled and included in a PDF**, with a detailed description.

5. Sometimes the HW will ask for proofs. You should anticipate doing those using LaTeX and include a PDF in the HW archive. If you've never used LaTeX before, this will be a good time to learn how to use it[1]. On Windows I like the TeX Live distribution of Latex and Texnic Center for editing *.tex files, but there are tons more out there, including WYSIWYG options that might be easier to start with.

6. I would **strongly recommend** to solve HW using a *Jupyter Notebook*, i.e., what you must upload is the *.ipnyb* source file and the PDF.

Making my life difficult will make me unhappy, so here are some details to also keep in mind*:*

- If I ask questions in the problems statement, **answer them**.

- There is no need to restate the question in your answer, so please don't.

- Give me presentable work, not some scribbles.

- Please use the reference books that are in our library: "Python for scientists" by Stewart, John M (Located at 001.6424/S829) and "*Numerical methods in engineering with python 3*" by Kiusalaas, Jaan (Located at 001.6424/K488).

- The point of the homework is to work together to build your knowledge of math and sometimes overcome common misconceptions associated with the given topic. **Ask questions if you are stuck!** There is no way of knowing you need help unless you let me know.

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[1]You will be constantly dealing with mathematical notation and LaTeX is the best for that. If you do not know how to use it, I will be more than happy to help you. For more information visit http://www.ctan.org/tex-archive/info/lshort/. I personally use LyX, which combines the power and flexibility of TeX/LaTeX with the ease of use of a graphical interface. See http://www.lyx.org.

1 Hippocratic Oath

1. (*2.5 Points*) If you are struggling with some assignments or concepts, please let me know. I cannot help/guide you through an issue if I do not know it exists. I have just created a Forum, at the very top of the Aula Virtual, such that you have

   (a) An online space for collaboration and the exchange of ideas.

   (b) A medium to pose questions about homework assignments, readings, and course content.

   (c) A way for students to demonstrate the understanding or application of course material

   Introduce yourself using the forum. Who are you? Where are you from? Your background in general (major/year). Your knowledge of simulations and / or your expectations from this course. What career opportunity would you like to pursue upon graduation?

2. (*2.5 Points*) Write the following paragraph neatly on a clean sheet of paper:

   By my signature, I acknowledge that I have read, understand, and agree to these very simple rules to turn in my homework that will simplify Alejandro's life.

   Sign it, scan or take a picture of it and please upload it.

2 Programming

1. (*25 Points*) Write a program that calculates the first n Lucas Numbers[2], i.e., $1, 3, 4, \ldots, L_n$.

2. (*20 Points*) Create a git repository[3] on *https://github.com* or *https://bitbucket.org/* and made a *commit* with a code of the previous problem. How many can you compute with your algorithm in roughly one hour of a single CPU? Plot n vs L_n for that maximum n you were able to compute. **The solution of this question is the URL of your repository.**

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[2]http://mathworld.wolfram.com/LucasNumber.html

[3]*The following link may be a good source for more information http://rogerdudler.github.io/git-guide/. The great Linus Torvalds talks about git, his second biggest project, in his TED Talk «The mind behind Linux».*