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Reading

ABT App. A, B, C, Ch. 1, 2, 9, 11.1-11.3

Problem 1: Redoing old HWs, Clarifying Lecture

Here, you have the chance to go through all your old homeworks and redo parts that you got wrong, and think about parts of lecture that were confusing.

(a) Choose ≥ 1 problem for which you received less than 75% of full credit and redo the parts you got wrong (or didn't turn in). You may consult the HW solutions and any other sources you like, but your solution must be your own and note any sources that you consult. In your new writeup, explain what you got wrong in your original HW, including why you had the original misconception and/or confusion, and why your understanding has changed now. (Note: if you have any codes that are not functioning, this is the time to fix them!!) Turn in the relevant parts of your original HW (or a photocopy if you'd like to keep your HW). You are encouraged to choose the problems on which you performed the poorest. (If you choose ≥ 2 problems that require substantial revision, you will get some form of extra credit for these extra ones.)

(a) **Alternative:** If you only have minor deductions from all of your HWs, do the 'Optional (Challenge) Problem' from HW2. If you try the challenge problem, your code should evaluate everything explicitly without using software to simplify the work, and you should note the difference in sensitivity to your initial guess. Design plots to turn in that clearly demonstrate your findings.* You should notice something counterintuitive about your result. Comment on this and make a guess as to why this may be. (Turn in your code as well.) (*Note: Part of good data analysis is figuring out what the interesting behavior is and presenting your findings clearly.) (If you already turned in results for the challenge problem and have no problems with $<75\%$, tell me and I'll give you something else to do instead.)

(b) Pick a topic from lecture that you originally had difficulty with. Explain the topic in enough quantitative detail that it can be understood by another student taking the class. (As a guide to how detailed this should be, you can pretend you are giving a mini-lecture to a friend of yours who was in the original lecture but did not understand it, and you are trying to help him.) You may consult the lecture notes and other sources, but you must write this up in your own words (and as always, note sources that you used). Explain why you originally had difficulties with the topic, and explain why your understanding has changed now.

(b) **Alternative:** If all of the lecture topics have generally been straightforward for you, give a complete derivation of the following 2 points that we glossed over in class.

$$(b.iA) P(\mu|\{x_k\}) \propto \int_0^\infty \frac{1}{\sigma^N} \exp\left[-\frac{1}{2\sigma^2} \sum (x_k - \mu)^2\right] d\sigma = [\sum (x_k - \mu)^2]^{-(N-1)/2}$$

$$(b.iiA) \begin{pmatrix} \sigma_x^2 & \sigma_{xy}^2 \\ \sigma_{xy}^2 & \sigma_y^2 \end{pmatrix} = \begin{pmatrix} \frac{\partial^2 F}{\partial x^2} & \frac{\partial^2 F}{\partial x \partial y} \\ \frac{\partial^2 F}{\partial x \partial y} & \frac{\partial^2 F}{\partial y^2} \end{pmatrix}^{-1}$$

Problem 2: Read Aster

Although we have not been closely following the textbook (ABT), you should be trying to read the relevant sections (see syllabus).

(a) Read all the sections relevant to what we have covered in class so far. (You should plan to spend a minimum of 1 hour on this if you haven't been keeping up with the reading.) As a reminder, this includes Ch. 1, App. A, B, C, Ch. 2, Ch. 9, and parts of Ch. 11. (Nothing to turn in.)

(b) Write some comments (at least a few sentences, no more than half a page) about something new you learned that we did not discuss in lecture or that ABT has a more thorough discussion of. Be specific (i.e., include mathematical notation if necessary).

(c) Write some comments (at least a few sentences, no more than half a page) about either something in ABT that is confusing to you or something in ABT that is glossed over that the lectures have had a more thorough discussion of. Try to be specific about what your confusion is or about how the lectures go beyond what is in ABT.