PHYSICS 573: NUMERICAL METHODS

PHYSICS 643: COMPUTATIONAL PHYSICS

HOMEWORK ASSIGNMENT 3

Due: Feb. 15, 2022

- Read *NR* §5.7, §6.5, §6.7, §6.13, §7.0, and §7.1 (by the Thursday class before the due date).
- Select some particular non-trivial *special* function (as defined in class, not a polynomial) that arises in physics and briefly mention/describe the scientific application in a README file. Develop a C or C++ algorithm that *efficiently numerically* computes (not just calls) that special function (noting techniques mentioned in the reading). Run it on ISAAC and save the output.
- Use gnuplot or equivalent to plot your output numerical computation of the special function over some range of its argument and save a PDF copy of the plot.
- Save your homework on ISAAC in the subdirectory $HOME/p643/outbox/home3 .
- For an extra challenge, repeat the above for a different *special* function.
- For a bigger challenge, plot a function that arises in physics and superimpose its derivative, obtained using your own (possibly simple, possibly not so simple) routine.
- In order for homework to be visible for grading:
  - Do this once: `chgrp tug2404 $HOME`
  - Do this once: `chmod 750 $HOME`
  - Check that your files at …/homeN are group readable and executable (g+rx). You might need to do: `chmod -R 750 $HOME/p643/outbox`
- For this and all future homeworks, for full credit you must:
  - Develop C or C++ code which is compiled and run on ISAAC, producing saved file output.
  - Save your C or C++ source code, compiled program, program output files and plots, and explanatory README at $HOME/p643/outbox/homeN .
  - Be sure all of your homework is visible for grading as explained above.
  - Use the README to briefly describe the scientific purpose of the computation, necessary user inputs to run the program, and relevant comments about the accuracy and efficiency of the computation.
  - Use a non-trivial method of comparable sophistication and efficiency as the examples and techniques discussed in class and the reading, with comparable attention to accuracy and efficiency. It should differ non-trivially from those of other students and the instructor's kick-off example (which might not have a science connection explained). (Of course, do not use ready-to-go examples from the internet or past students.)

Assignments are posted at our Instructure Canvas course site https://utk.instructure.com.
Other information concerning this class is available at https://sites.google.com/site/utkp643/.

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