

CSCI 3294 (Seminar: UNIX Power Tools), Fall 2016

Homework 7

Credit: 50 points.

1 Reading

Be sure you have read, or at least skimmed, the readings for 10/17 and 10/12.

2 Honor Code Statement

Please include with each part of the assignment the Honor Code pledge or just the word “pledged”, plus one or more of the following about collaboration and help (as many as apply).¹ Text *in italics* is explanatory or something for you to fill in. For written assignments, it should go right after your name and the assignment number; for programming assignments, it should go in comments at the start of your program.

- This assignment is entirely my own work.
- This assignment is entirely my own work, except for portions I got from the assignment itself (*some programming assignments include “starter code”*) or sample programs for the course (*from which you can borrow freely — that’s what they’re for*).
- I worked with *names of other students* on this assignment.
- I got help with this assignment from *source of help — ACM tutoring, another student in the course, the instructor, etc.*
- I got significant help from *outside source — a book other than the textbook (give title and author), a Web site (give its URL), etc.. (“Significant” here means more than just a little assistance with tools — you don’t need to tell me that you looked up an error message on the Web, but if you found an algorithm or a code sketch, tell me about that.)*
- I provided significant help to *names of students* on this assignment. (*“Significant” here means more than just a little assistance with tools — you don’t need to tell me about helping other students decipher compiler error messages, but beyond that, do tell me.*)

3 Programming Problems

(This isn’t exactly a programming problem, but I want your source files by e-mail so I can confirm that they can be turned into the formatted document on a semi-standard Linux system. So follow the standard instructions below, except interpret “program source” as “ \LaTeX and other source” and “programs” as “document”, and send me files in e-mail as described below.)

Do the following programming problems. You will end up with at least one code file per problem. Submit your program source (and any other needed files) by sending mail to **bmassing@**

¹Credit where credit is due: I based the wording of this list on a posting to a SIGCSE mailing list. SIGCSE is the ACM’s Special Interest Group on CS Education.

cs.trinity.edu with each file as an attachment. Please use a subject line that mentions the course and the assignment (e.g., “csci 3294 hw 7” or “UNIX hw 7”). You can develop your programs on any system that provides the needed functionality, but I will test them on one of the department’s Linux machines, so you should probably make sure they work in that environment before turning them in.

For this assignment your mission is to create a \LaTeX document (using the `article` class) that includes examples of a number of features. You will also use `gnuplot` to create at least two plots to be incorporated into your document and write a simple bibliography file to be processed by \BIBTeX .

1. (5 points) Overall, your document should contain the following:

- A title/author/date header with your name, the date you finish the assignment, and a title of your choice.
- A section called “Honor code statement” containing the Honor Code pledge, or just the word “pledged”, plus whether you got/gave help.
- A section called “Basics” containing elements described in question 2
- A section called “Figures and tables” containing elements described in question 3.
- A bibliography, created using \BIBTeX , as described in problem 5.

Your document can also include anything else you think is interesting or might be fun to try to figure out how to do. An obvious possibility is one or more figures drawn using one of \LaTeX ’s picture-drawing environments. (If you decide to try `TikZ`, you should be able to find a manual for it online.)

2. (10 points) The “Basics” section should include the following:

- A bulleted or numbered list of (some) things you learned from the readings for this assignment and think you might find useful.
- A bulleted or numbered list of (some) things you would like to be able to do in a document and don’t (yet) know how to do with \LaTeX .
- At least one example of not-totally-trivial math typesetting, set inline or displayed on a line by itself as in the “sampler” example. (If you choose the latter, it’s up to you whether to use the `equation` environment to number it.) If no more-interesting examples occur to you, use the quadratic formula $((-b \pm \sqrt{b^2 - 4ac})/(2a))$.
- At least one example of referencing a section using `\ref` (e.g., “my tables and plots are in Section N”, where N is whatever section they’re in), and at least one example of referencing something in your bibliography (described later). (Note that by default the bibliography section of the formatted document includes only items actually referenced. You can make it include all items with `\nocite{*}`.)

3. (10 points) The “Figures and tables” section should include the following:

- A table showing your schedule for this semester. Use the `tabular` environment to make the table and the `table` environment to make it a numbered floating table. Include a caption, and put something in your text referencing the table (e.g., “Table N shows my schedule for this semester”).

It’s up to you what exactly should go in your table and how it should look, but if nothing else occurs to you, make a four-column table showing for each course its number and name, the instructor’s name, and meeting times.

- A figure displaying program source for a short program, in whatever language you choose. Use `\verbatim` or `\verbatiminput` to typeset the code, use the `figure` environment to make it a floating figure with a caption, and include something in your text referencing it (e.g., “Figure N shows a simple C program”).
- At least two plots produced using `gnuplot`, as described in problem 4. Use the `figure` environment to make each a floating figure, include a caption for each, and put something in your text referencing all of them. (e.g., “Figure Y shows plotting a formula with `gnuplot`”).

It’s up to you exactly how to incorporate the plots into your document; you could generate `.png` images and include them with `\includegraphics`, or you could generate combined `.tex` source and EPS as in one of the examples shown in class, or you might discover another option.

4. (15 points) Use `gnuplot` to create at least two plots, one plotting one or more formulas and one plotting data.

It’s up to you what to plot, but if nothing more interesting occurs to you:

For the formulas you could do the kind of plot I often use in class to illustrate order of magnitude of functions, showing a few $O(N^2)$ and $O(N^3)$ functions (at least two of each) and specifying the x-range (starting at 0 and going up to whatever will make the plot meaningful).

For the data you could do a bar chart using output of this simple C program² `rand.c`³ that generates “random” data. (To compile it you’ll need `-std=c99`. The compiled program takes two command-line arguments, a seed value and a count.)

5. (10 points) Create a bibliography using `BIBTEX`, containing at least two different kinds of references. Simplest to do are probably books and Web sites, but if you’ve ever included other references in a bibliography for another course (e.g., a journal article), try including one of those as well. For books you could just pick one or more of the textbooks you’re using this semester, and for Web sites — well, you could use the one for this course or anything that appeals to you.

On all of the above, I will give extra points for anything that seems to go well beyond the minimum requirements.

If you find parts or all of this assignment very easy because you’ve used `LATEX` before, try to go beyond what you’ve done previously.

You’re welcome to copy text from any of the examples on the class “sample programs” page, as long as you understand reasonably well what the copied lines do.

Turn in (by e-mail):

- Your `LATEX` source, in the form of one or more `.tex` files.
- “Source” for your plots, in the form of `.plotin` files containing `gnuplot` input and `.dat` files containing data.
- Your bibliography “source”, in the form of a `.bib` file to be processed by `BIBTEX`.

²Why a C program? well, it was quick and easy to adapt one I had written for CSCI 1120.

³http://www.cs.trinity.edu/~bmassing/Classes/CS3294_2016fall/Homeworks/HW07/Problems/rands.c

- Any other files needed to generate your document.
- A PDF version of your document.
- A plain-text `README.txt` file with the commands you used to generate the PDF version (including any commands needed to generate image or other files).

(*Note:* In class I may have mentioned that there are several IDE-like environments for \LaTeX . For this assignment, however, I recommend that you not use one of them; I think you will learn more by writing the \LaTeX source with a simple text editor.)