PROOFS PORTFOLIO—FINAL GUIDELINES

Final draft due: December 18, 2018.

General guidelines:
Your portfolio should include the following. Use the provided template, which will include a table of contents and rubrics (for Prof. Daugherty to fill out).

Introduction: You can write about any themes you see in your portfolio, or about things that you've learned in the process or in this class. Basically, talk about some combination of this portfolio, this class, yourself and your progress. The introduction's purpose is to set the stage for what your reader is about to read. Of course, this should probably be the last thing you write, after everything else is done.

Proofs:

☐ One writeup of a "Proof without words".
☐ One rewrite of a proof from Exam 1 (part 2).
☐ Proofs from proof labs satisfying:
　☐ at least one proof from each proof lab,
　☐ totaling at least 8 ⋆'s,
　☐ including at least one (⋆ ⋆ ⋆) problem.

Note: The grades of the proof-lab problems will be weighted by the corresponding number of stars.

Each proof should include a problem statement and where it came from. Each proof should be on its own page(s).

Reflections: For **two** of your proofs (from any section), include the following.

☐ An early draft of your proof.
☐ A copy of a peer-review of an early draft.
☐ A self-reflection of how your final draft has improved on your earlier drafts. What's new? What's different? Why did you make the changes you did? Go deep.

Attach the early peer reviews as appendices and label them as such.

Grades:
Each final draft proof will the graded as follows.

Criteria	Points Possible				
complete	0	1	2	3	4
mathematically valid	0	1	2	3	4
readable	0	1	2	3	4
mathematically fluent	0	1	2	3	4
Total:			(out of 16)		

- **Completion:** Avoid "glossing over" substantial steps in your reasoning. Each statement you make should follow logically from the statement before it. In most cases, writing in complete sentences will give the clearest argument. You are writing to convince someone else that the claim is true, which is a higher burden than convincing only yourself.

  Check:
    - ☐ Did you prove the statement?
    - ☐ Did you catch all the cases? All the steps?
    - ☐ Did you define everything that needed to be defined?

- **Mathematically valid:** Was everything you said actually true?

- **Readability:** This is both about style and about targeting the appropriate audience. For your audience, think about writing to convince a student who is taking Bridge, but perhaps at a different university, where they haven't covered exactly the same material, or used exactly the same notation. For example, you can take for granted that the area of a triangle is $\frac{1}{2}$(base) $*$ (height), but you should also say that if you plan to use it. Similarly, you don't have to teach your reader that an implication is equivalent to its contrapositive, but you should be explicit if you intend to prove the contrapositive instead of the implication itself.

  For style, the reader should not have to work hard to follow what you are trying to tell them. Long strings of equations should be broken up with some commentary on the manipulation being performed. Any diagrams used should be carefully explained in complete sentences. Dense mathematical notation should occasionally be translated to help the audience follow.

  Check:
    - ☐ Is your proof readable? Is it under-written? Is it over-written?
    - ☐ Did you use complete sentences?
    - ☐ Did you use an appropriate amount of displayed equations, white space, etc.?
    - ☐ Do you explain and motivate your statements, diagrams, implications, etc. at an appropriate level?

- **Mathematical fluency:** Basically, write like a mathematician. If you introduce notation, explain to the reader what it means. For example, rather than saying "Consider A," say, "Consider a set A." When you define notation, consistently use the same type of notation for the same type of objects (e.g. using capital letters to denote sets, and lower-case letters to denote elements). Use notation in the proof that is consistent with the notation in the claim—if the theorem uses a and b, you should also use a and b. As always, notation is case-sensitive (e.g. A and a should refer to different things).

  Part of the point of the Proof Portfolio component of the course is to practice using correct and established notation and terminology in your written reasoning. Often, the best approach is to balance the efficiency of mathematical notation with reasoned English narrative. (Of course, this has some overlap with readability.)

This is an adaptation of [1] and [2].

References

[1] G. Spencer, *A revise-and-resubmit proof portfolio*, MAA Focus Magazine, April/May (2017), pp. 10–13.
[2] D. Brown and S. Michel, *Assessing proofs with rubrics: the RVF method*, Proceedings of the 13th Annual Conference on Research in Undergraduate Mathematics Education, Raleigh, NC. Retrieved from http://sigmaa.maa.org/rume2010/Archive/Brown_D.pdf