PROOFS PORTFOLIO—INITIAL GUIDELINES

Final draft due: December 18, 2018.

General guidelines: At the end of the semester, you'll submit a portfolio of proofs that will show a broad sample of the proofs you have written throughout the semester. For example, your portfolio should **include** (but not be limited to)

- exactly one writeup of a "Proof without words";
- one proof from exam 1;
- one proof from each "proof lab" day.

No proofs with posted solutions will be accepted. **Exact requirements and expected content will be outlined by the end of the course**, but for now, keep all drafts of the proofs you write throughout the semester.

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)

For a few of your proofs, there will also be an **improvement** component, based on old (probably marked-up) drafts. So be sure to hold on to everything!

- **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 $\frac{1}{2}(\text{base}) * (\text{height})$, 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 [**?**] and [**?**].

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/rume/crume2010/Archive/Brown_D.pdf