"Proofs for the Public" writing assignment.   **Fall 2018 MA 274**

Overall Goal: In this paper, you will take one of the more significant proofs (or a few closely related proofs) from the course or text and explain to the mathematically educated general public the underlying concepts, how they fit together, and their broader relevance.

The excellent paper will draw the reader into the subject with apt analogies, metaphors, figures, or applications. These analogies, metaphors, and applications will, however, be clearly separated from logical argument. **Furthermore, the paper itself must be in a "non-fiction genre" rather than "fiction"** (unlike the Math Fable). The paper will introduce the relevant definitions and show how mathematical ideas can be logically ordered so as to produce the result. It will be neither drown in technicalities nor wallow in vague generalities, but will select with care the right idea at the right moment.

Audience: You should aim your paper at people who have had some college level math courses (eg. calculus) but who may not remember it particularly well and who may not understand the importance and relevance of abstract mathematics. You should assume that the person reading your essay is interested in mathematics and is willing to be persuaded that what you have to say is interesting.

Content: In consultation with your professor, you should pick one of the more interesting results or collection of related results from the course (either from HW, reading, or class discussion) and explain the relevant definitions, theorems, and proofs in a way that the intended audience will find accessible. Your proofs must concern **equivalence relations, properties of functions, or induction** and **must be different from the proof you chose for the Math Fable**. You may choose to help your exposition by using vivid metaphors and analogies and by including images or figures. You may choose to leave out details which are overly technical or which will distract from the beauty of the arguments you are conveying. However, you should include all the major ideas incorporated in the proof. Please note the following requirements:
- You may not choose proofs from the chapter on cardinality. It is too difficult to bring an original perspective to bear on these topics. (Do an internet search to see what I mean!) Similarly, you may not choose material from before the section on equivalence relations.

- You may not use sources other than the text, course notes, and your own imagination. If you break this requirement (and doing so will impact your paper grade), you must cite whatever sources you draw on (whether for specific language or general ideas). Failure to do so will likely result in a report of academic dishonesty.

Formatting: You must type your paper in LaTeX (the mathematical typsetting system). You should use 11 pt font and the default margins. Images should be included as figures, as in the sample document. Neatly hand-drawn figures, scanned in and included in the file are acceptable. All figures should be referenced in the text. The paper, including any figures, should be $3-4$ pages long, depending on topic.

Grading Rubric:

25%   To what extent is the paper accessible to the intended audience? Are analogies, metaphors, and figures aptly deployed?

25%   To what extent is the paper engagingly written. To what extent is there the right blend of formality and informality and the right level of detail?

25%   Is the mathematics correct and interesting? Are there significant ideas which have been incorrectly explained or omitted? Are the ideas assembled in clear, logical fashion?

10%   To what extent is the mathematics put into a larger intellectual context? Is it clear why a non-mathematician should be interested in the results?

10%   Is the paper correctly typed in LaTex, following the formatting rules?

5%   To what extent does the writing exhibit correct grammar, punctuation, and spelling?

More Information on the Paper

How do I choose a topic?

Think about what topics from the course have interested you most: graphs? equivalence relations? sequences?

Pick one aspect of that topic that you want to explain to a mathematically educated general audience. Your paper will likely center around one proof which you want to explain in an engaging and accessible way.

What are the deadlines?

Thurs. 11/28 before 4 PM: You should email me your topic and a paragraph explaining the approach you'll take to it.

Mon. 12/3 before 4 PM (optional): Email me a draft of your paper to read and comment on.

Tues. 12/11: Final draft of paper (typed with LaTeX) print copy submitted to my office **and** electronic copy submitted by email. Although the deadline is after the start of finals, and our final exam isn't until 12/17, you are **strongly encouraged** to complete your paper by the last day of classes.