WRITING GOALS AND PROOF WRITING RESOURCES

MATH 351: MODERN ALGEBRA I (SECTION 02)
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The two goals in this course are

(1) to increase your understanding and ability to apply the content of Abstract Algebra; and
(2) to advance your ability to craft proofs and write effectively.

This document focuses on (2): crafting logical arguments.

These should satisfy the following ideals:

(i) Proofs should follow most standards of the English language:
Generally, they should be written in complete sentences, following the usual punctuation, grammar, and spelling rules, etc.

(ii) Proofs should be complete:
They should have a beginning (initiating the problem, introducing objects), a middle (the logical argument), and an end (the desired conclusion).

(iii) Proofs should be clear:
A reader should be able to understand not just each sentence, but the logical structure of the proof as a whole.

(iv) Proofs should be coherent:
One line should logically follow from the previous, unless a detour is indicated.

(v) All objects should be identified:
Symbols, variables, etc should be specified as to what sort of object they are, what properties they have (and why we can say/assume they have them), and potentially where they are living and how they relate to the other objects in discussion.

(vi) Symbols and words should be used properly and precisely:
As part of being coherent, any statement or expression your write (in English or math symbols) should make sense (which is different than the statement being mathematically correct)

Proof writing resources. Here are some addition resources to help understand both how to write a proof as well as the role of a proof.

- *Elements of Style* by Dr. Anders Hendrickson, Concordia College (link).
  This is a quick set of "rules" to follow when writing proofs.
- *How to write proofs: a quick guide* by Dr. Eugenia Cheng, University of Chicago (link).
  This is a longer exposition on proofs, with examples, explainations, insights, and exposition. Dr. Cheng is a fanastic research mathematician and math communicator[1]
- *Guidelines for good mathematical writing* by Dr. Francis Su (link).
  Somewhere inbetween the two.

[1]For example, here is a video on *category theory*, one of the most abstract banches of mathematics, explained using real-life relationships.