Writing Assignment
Math 417, Jeremiah Heller
Spring 2023

Why a writing assignment?
There are several reasons for including a writing assignment in a math class. First of all, writing is a significant part of what a mathematician does\(^1\) and the ability to communicate complex technical ideas is an essential skill across disciplines. Second, writing about something is an excellent way to reinforce and refine your understanding of that topic.

Assignment

Write a mathematical paper proving the theorem described below. The assignment, worth 60 points in total, is broken into parts, each with their own due date.\(^2\)

Part 1 (10 points, due on 2/22.) Write a 1-2 page paper explaining the concepts of group, abelian group, subgroup, etc... Include examples and explanations of notation.

Part 2 (10 points, due on 3/1.) Let \(G\) be a group.
(a) The center of \(G\) is defined as
\[
Z(G) = \{ g \in G \mid gx = xg \text{ for all } x \in G \}.
\]
Prove that \(Z(G)\) is an abelian subgroup of \(G\).
(b) Let \(x \in G\). Define the centralizer of \(x\) to be
\[
C(x) = \{ g \in G \mid gx = xg \}.
\]
Prove that \(C(x)\) is a subgroup of \(G\).

Final paper (40 points, due on 4/5.)\(^3\) Write a paper proving the following theorem:
\[
Z(G) = \bigcap_{x \in G} C(x).
\]

Guidelines for the final paper

(1) You should type your paper. Your best option is to use latex. If you use a word processor\(^4\) you may choose to leave space for mathematical symbols and write these in by hand.

\(^1\) We write research papers, we write grant proposals, we write textbooks, we write lecture notes. The list goes on.

\(^2\) These due dates are more flexible than for the homeworks. However, for any part to be accepted late, you should contact me to make arrangements before the due date.

\(^3\) You may submit a draft of your paper for comments, before turning it in for a grade. If you are submitting a draft, turn it in by 3/22.

\(^4\) This is typically more painful than simply learning to use latex.
(2) Your target audience consists of your peers who do not already know abstract algebra.⁵

(3) Your paper should contain relevant definitions, illustrative examples, some lemmas or propositions, at least one theorem, appropriate citations, and a bibliography.

Grading

Your paper will be evaluated on the following:
• **Correctness and Completeness.** All arguments should be mathematically correct and complete.
• **Clarity.** Your reader should be able to understand your writing without difficulty. Do you use technical jargon and mathematical symbols when simple and plain English words would suffice? Have you defined all necessary terminology and notation? Does your paper have a logical progression of ideas?
• **Composition.** Does your writing flow from one paragraph to the next? Is it cohesive? Are you using correct grammar?

**Resources to assist mathematical writing**


(2) **LaTeX tutorial:** [https://www.overleaf.com/learn/latex/Learn-LaTeX_in_30_minutes](https://www.overleaf.com/learn/latex/Learn-LaTeX_in_30_minutes).

⁵ For example, your classmates at the start of the semester.