MTH-260: Transition to Higher Mathematics
Spring Semester 2018
Guidelines for the Portfolio Project[1]

Prof. Rall

Description of the Portfolio Project

The Portfolio for MTH-260 will consist of six mathematical problems and one expository essay. The essay will require a proof of at least one mathematical result. Each student may submit two drafts for review for each of the portfolio problems in Group #1, one draft for review for each of the portfolio problems in Group #2, and one draft for review of the portfolio essay. These will be submitted to the professor according to the guidelines established in this document. The professor will review and critique each submission, make recommendations and will give each draft a provisional grade that is intended to help you understand the current state of your work. The third draft of any portfolio problem from Group #1, the second draft of any portfolio problem from Group #2, the second draft of the portfolio essay will be the final draft and will be given a final grade.

Important Guidelines and Rules for the Portfolio Problems and Portfolio Essay

1. **You may not discuss your work on the portfolio project with anyone except the instructor of the course**. This means that you are not allowed to talk to other students, professors or anyone else about your solutions. Violation of this policy could result in a grade of zero on a given problem or possibly failure of the course.

2. **You may not use any sources to help complete the portfolio problems or the essay other than the textbook unless a specific problem indicates that another source may be used on that problem**. This means that you are not allowed to use other books or the Internet to find information about the problems unless specifically directed to do so as part of the problem statement. If you think you need some background information or a definition from another source, then ask the instructor for permission. If permission is granted, then you may look up the necessary information and include it with a footnote in your proof.

3. **All drafts must follow the guidelines for mathematical writing that are in the textbook or that we discuss in class**.

4. **No more than one Portfolio Problem may be submitted for review on a given day**.

5. **No more than three portfolio problems may be submitted for review during a given week**. A week will be considered to start at 12:00 a.m. on Monday.

6. I will not discuss portfolio problems in my office after the posted deadlines for submitting drafts. (See the section on deadlines later in the document.)

Typesetting the Portfolio Problems

The portfolio problems must be completed using the mathematical typesetting program known as LaTeX.

[1] Adapted from Prof. T. Sundstrom, Grand Valley State University

All students in MTH-260 are required to learn to use LaTeX, the professional typesetting software of choice for mathematicians. (This document itself is written in LaTeX.) It takes some modest effort at first to learn LaTeX, but it is the best option for typesetting mathematics and will be useful throughout your work in future mathematics and science courses (and possibly others). Each portfolio problem and the portfolio essay must be typeset using LaTeX and submitted as a PDF document. (The way to submit these is explained later in this document.) One of the best ways to learn LaTeX is to take a source file created by someone who uses LaTeX and compare that with the PDF it produces. Experimenting by making small changes in the source file will go a long way toward helping you understand the program.

You can of course finds lots of help online for various LaTeX commands. There are also a number of excellent books, one of which is *More Math Into LaTeX*, by George Grätzer. There is a copy on the bookshelf in The Principal Pigeonhole. Please do not remove it from that room!

The LaTeX program is available in several different forms for free (or almost free).
Prof. Robert Talbert of the Grand Valley State University Mathematics Department has developed a sequence of screencasts that explain what LaTeX is and how to get started using it. You can access this informative series here:

https://www.youtube.com/watch?v=cTEfw-jUqAg

I use a LaTeX package called MiKTeX on my PC together with a very nice text editor called WinEdt. MiKTeX is free to download and WinEdt is very reasonable. I think the version I use cost me $39. Another option is to do LaTeX in the cloud for free. One of the common ones is ShareLaTeX. Check out this possibility at `https://www.sharelatex.com/`.

Submission of the Portfolio Problems and Essay

Every draft of a portfolio problem must be submitted to me as a PDF file in the private folder I have created for you in Box. You should soon receive an invitation from me to share a folder with your name. Inside this folder are two folders. One of these is for you to submit a draft, and the other is where I will place your submission after I have reviewed it.

- Make sure the name of your file is of the form:

  (last name)-Problem-*p*-Draft-*d*.pdf,

  For example, if I was submitting a second draft of problem 3 as a student in this class, the file would be titled

  Rall-Problem-3-Draft-2.pdf

Due Dates for Problems and Essay

The Portfolio Problems are divided into two groups. (The actual problems will be in another document.) Although you will be regularly submitting documents for review, there are some deadlines for submitting problems and the essay for review and for submitting the final versions of the portfolio problems and the essay.

Group #1 Portfolio Problems

- The deadline for discussion and submission of problems from Group #1 for review is February 21, 2018.
- The last day to submit problems from Group #1 for a grade is February 28, 2018.

Group #2 Portfolio Problems

- The deadline for discussion and submission of problems from Group #2 for review is March 19, 2018.
- The last day to submit Problems from Group #2 for a grade is March 26, 2018.

Portfolio Essay

- The deadline for discussion and submission of a draft of the essay for review is April 13, 2018.
- The last day to submit the essay for a grade is April 20, 2018.

Grading of Portfolio Problems

Each problem in your portfolio will be graded on a ten point scale. There will be little partial credit because of the opportunity to submit problems for review, to re-write, and to re-submit. In order to receive full credit for a problem, your solution must be correct, complete, and written according to the writing guidelines established in the text and in the course with no spelling or grammatical errors. Following is a description of the ten point scale for grading each problem:

Points	Description
10	The proof is mathematically correct and written according to the guidelines in the text and in the course.
9	The proof is mathematically correct but there is a minor error (note singular) in writing.
6	Significant mathematical progress has been made towards a proof but either the argument has one major error or the proof is not written according to the guidelines.
3	There is evidence of having some good ideas for constructing a proof and making an effort to write a formal proof.
0	Little or no progress has been made in developing a proof.

The grading scale for the portfolio essay will be based on twenty points and will follow the scale given above with all point values multiplied by 2.

Some anticipated questions about the Portfolio Problems

The answers to these questions contain some very important requirements and guidelines for the Portfolio Project.

What other requirements are there for my Portfolio Problems?
The solution for each problem must be written using complete sentences and according to the writing guidelines specified in the text and in the course. It must be neat, well organized, and easy to read. Proper grammar, proper sentence and paragraph structure, and correct spelling are necessities.

What happens if I submit an incorrect or incomplete solution?
The professor will return your draft in your "Reviewed" folder and indicate if it is ready for your Portfolio or if it needs more work. When you submit a solution for a problem before the last day for review, you are asking the professor, Is this good enough for my Portfolio?

Should I wait and submit all my problems for review on the last day?
NO!! Begin working on your Portfolio Project immediately. As soon as you have a proposed solution for a problem, you should write your solution and submit it in the Box folder for review.

Can I work with someone else or use sources other than the textbook?
The only person you can discuss these problems with is the instructor for the course and the only resource you may use is the textbook unless there are specific directions in a given problem. Plagiarism is not acceptable and will not be tolerated. No credit will be given for the solutions of problems in which plagiarism is involved.

What criteria will be used to judge my proofs?
A proof must be logically and mathematically correct. In addition, it must be written according to the course guidelines as developed in the text and discussed in class.

How should I start working on a particular problem?
Before beginning your proof or solution of the problem, you should make a clear statement of exactly what it is that is given in problem (the assumptions) and what is to be proven (the goal). That is, you should analyze the theorem or problem by carefully examining what is given or assumed and precisely what it is that will be proven. In this analysis, you should include any relevant definitions that are needed to clarify the statement of the problem. You should also elaborate on the assumptions made and the strategies that can be used to prove what it is that you are trying to prove. If it is appropriate, you must also include some examples to illustrate the problem.

What are the writing guidelines for writing the solutions of the Portfolio Problems?
To receive full credit, the solution of a Portfolio Problem must be of collegiate quality and follow the writing guidelines for this course that are given in the textbook and discussed in the course. This means that, in addition to demonstrating mastery of the subject matter, the solution should be neat and easy to read, well organized, and use proper grammar and spelling. In addition, a solution must meet the following guidelines:

- You should begin your presentation with a carefully worded statement of the problem. You should state the problem using simple declarative sentences. Following is a typical textbook problem.

  Prove that if n is an integer and n^2 is odd, then n is odd.

  If you were writing a solution to this problem for one of these portfolio problems, you should begin something like the following:

  Proposition: If n is an integer and n^2 is an odd integer, then n is an odd integer.

- All calculations and algebraic manipulations must be clearly shown. By doing so, both you and your professor can follow the process you used to obtain an answer. Without a step-by-step presentation, it may be impossible to understand your solution, or if a mistake is made, it may be impossible to determine where a mistake was made.

- You might start your solution with a short discussion of the strategy that you will use. This is required if you use an indirect method of proof such as a proof by contradiction or the use of the contrapositive statement. In addition, you should conclude any proof with a statement of what has been proven, or minimally, that the proof is now complete.