MAT 470 Final Project One Guidelines and Rubric

Overview

The final project for this course is a mathematical proof and an oral defense of your mathematical proof. The main purpose of this project is to thoroughly and rigorously solve a mathematical proof and defend it in a recorded presentation for your classmates and your instructor. This assignment is an opportunity for you to thoroughly analyze and orally defend mathematical proofs in real analysis concerning the structure of the real numbers, sequences, continuity, differentiation, and Riemann integration.

You will practice your defense in Milestone Two using PowerPoint slides (or an alternate format) with audio recorded in Bongo. For the final project, you will create and submit a recording of your presentation in Bongo. This module's resources include instructions for recording, uploading, and creating captions in Bongo. Your instructor will provide feedback and ask you questions about your mathematical proof in Bongo. You will submit your answers to those questions and reflect on you work in Bongo for Final project Two, which is due in Module Eight.

The final projects are an authentic demonstration of your competency. You will use your critical thinking skills to solve and orally defend your mathematical proof. The projects are supported by **two milestones**, which will be submitted at various points throughout the course to scaffold learning and ensure quality final submissions. These milestones will be submitted in **Modules Two and Five.** You will submit your **final mathematical proof in Module Seven** and your **oral defense in Module Eight.**

The following general topics can be used to guide your more specific topic selection:

- Explain the process of constructing the real number system beginning with the natural numbers.
- Prove implications of axioms and properties of the real number system.
- Describe the concept of an ordered field as it applies to the real number system.
- Describe the idea of a limit of a function at a point.
- Determine whether a given function is continuous, discontinuous, or uniformly continuous.
- Explain the connection between the continuity of a function at a point and the function being differentiable at a point.
- Prove and apply the fundamental theorem of calculus in finding the value of specific Riemann integrals of functions.

NOTE: The topic should be intimately connected to the structure of real numbers, sequences, continuity, differentiation, and Riemann integration real numbers.

The final project will assess your mastery with respect to the following course outcomes:

- Investigate properties in real analysis through problems concerning the structure of the real numbers, sequences, continuity, differentiation, and Riemann integration
- Write and orally defend mathematical proofs in real analysis concerning the structure of the real numbers, sequences, continuity, differentiation, and Riemann integration. Note that “orally defending” means not just presenting a proof but also defending it to individuals who may ask questions during the presentation

Prompt

Final Project One will be a recorded **presentation of your mathematical proof**. Your presentation should be 5-7 minutes in length. There are no specifications on how many slides to use. You will record your proof in Bongo, where your instructor can view it, provide feedbakc, and ask the questions you will answer in Final Project Two. **You must submit your recording no later than Thrursday at 11:59p.m.**

NOTE: It is possible that presenting your proof will require specialized mathematical notation. You may consider using an **alternative format rather than PowerPoint. OpenOffice is also an acceptable format.**

Specifically, your **presentation** must address the following **critical elements**:

I. Document the proof in detail with comprehensive supporting information, specifically:
   a. **Ensure mathematical representations** (equations, diagrams, graphs, etc.) **are clear and appropriate.**
   b. **Ensure that your use of mathematical terminology and notation is accurate.**
   c. **Present all of the main elements of the mathematical proof, including axioms and theorems.**
   d. **Explain the significant mathematical concepts involved** in your proof.

II. **Provide a thorough oral defense**, speaking clearly and effectively.

III. **Organize your presentation in a logical way** and pace the transitions so that the material is easily accessible to your audience of peers.

Milestones

Milestone One: *Topic Selection*

In **Module Two**, you will choose your topic. In a short one-page submission, you will submit your topic for your mathematical proof and oral defense. Please see the Milestone One Guidelines and Rubric document for guidance in addition to the grading criteria. **This will be graded separately using the Milestone One Rubric.** Feedback should be applied to the final project.

Milestone Two: *Rough Draft of Mathematical Proof and Practice Defense*

In **Module Five**, you will create your practice oral defense using PowerPoint with voice-over narration, or an alternative audio recording tool. You will submit the PowerPoint presentation (or alternative format) of the slides. **This assignment will be graded using the Milestone Two Rubric.** Feedback should be applied to the final project.

Final Project One: *Mathematical Proof*

In **Module Seven**, you will submit a recording of your mathematical proof by **11:59 p.m. on Thursday**. **This assignment will be graded using the Final Project One Rubric.**

Final Project Two: *Oral Defense*

You will record your answers to questions from the instructor in your oral defense. **This assignment will be graded using the Final Project Two Rubric.**

What to Submit

Record your presentation using Bongo. The presentation should be 5–7 minutes in length and should include PowerPoint slides (or alternative format) documenting the proof. The number of slides is not specified; Use what is needed to adequately support your proof.

Final Project One Rubric

Criteria	Exemplary (100%)	Proficient (85%)	Needs Improvement (55%)	Not Evident (0%)	Value
Mathematical Representations	Meets "Proficient" criteria and provides well-developed visual support for the proof	Documents the proof using mathematical representations that are clear and appropriate	Documents the proof using mathematical representations that are confusing or inconsistent	Does not document the proof using mathematical representations	15
Mathematical Terminology and Notation	Meets "Proficient" criteria, and use of terminology and notation is precise and sophisticated	Use of mathematical terminology and notation is accurate	Use of mathematical terminology and notation contains errors that interfere with the presentation of the proof	Use of mathematical terminology and notation has major errors	20
Elements of the Proof	Meets "Proficient" criteria and thoroughly documents the proof with comprehensive supporting details demonstrating a rigorous exploration of the topic	Includes the main elements of the proof, including axioms and theorems, demonstrating a complete exploration of the topic	Includes elements of the proof; however, demonstrates a limited exploration of the topic	Does not include the main elements of the proof	25
Mathematical Concepts	Meets "Proficient" criteria and illustrates concepts with examples	Accurately explains mathematical concepts required to understand the proof	Explains mathematical concepts required to understand the proof; however, information is missing or inaccurate	Does not explain mathematical concepts required to understand the proof	20
Oral Defense – Articulation	Meets "Proficient" criteria, and oral defense is well supported with appropriate examples	Provides a thorough oral defense	Provides a limited oral defense	Does not create an accurate oral defense	10

Criteria	Exemplary (100%)	Proficient (85%)	Needs Improvement (55%)	Not Evident (0%)	Value
Organization	Meets “Proficient” criteria and is organized and transitions are well-paced to create a natural and engaging flow	Presentation is organized in a logical way and transitions are paced so that the material is easily accessible to audience of peers	Presentation is organized; however, flow is not logical and transitions are paced so that the material can be understood only with focus and effort	Presentation is not organized in a logical way OR transitions are paced such that the material cannot be understood	10
				Total:	100%