BRIEF INTRODUCTION

MATH 465-001: NUMBER THEORY
INSTRUCTOR: RAKVI

1. What this Class is About

1.1. **Content.** Number theory is, at its core, the study of the integers and their properties, although today the field has grown to encompass a rich body of knowledge and conjectures that can appear far removed from this description. Major topics from the class will include prime factorization, modular arithmetic, primitive roots, quadratic reciprocity, and quadratic forms.

1.2. **Course Goals.** Although this is officially a class on number theory, it is just as much a class about mathematical literacy and communication. You will learn to read a text and communicate clearly. These skills are at least as challenging as the content itself! We do not expect that you come to class with these skills on the first day, but rather that you will build them over time.

These two aspects of the class are related. You will find that as you learn to write about mathematics more clearly, your own internal thinking while solving problems will be more precise, which will in turn aid your understanding of the course content.

1.3. **Textbook.** Our primary means for introducing new content is our textbook. The text for this course is *An Illustrated Theory of Numbers*, by Martin H. Weissman.

Not every mathematics book is well-written, but the textbook for this course is a great example of clear and complete mathematical writing, a skill that you will work towards in this class.

To quote your book: "Please enjoy this book, and spend ample time with the illustrations. The best math books are meant to be read slowly, with a pen and notebook, with ample time for staring out into space. A window is advisable. Be comfortable in an occasional state of confusion, and confident that clarity will follow someday."

To quote the mathematician Paul Halmos: "Don't just read it; fight it! Ask your own question, look for your own examples, discover your own proofs. Is the hypothesis necessary? Is the converse true? What happens in the classical special case? What about the degenerate cases? Where does the proof use the hypothesis?"

I think both authors offer excellent advice.