MA 638 - Section 7.1 Section Overview

Overview Purpose: The purpose of the section overviews is to outline the topics and examples that are important from this section. Details are not provided in the overview and it is expected that the students will read the textbook to fill in the details of the listed topics and examples. Some basic details will be covered in the overview videos, where most of the in-depth analysis will be discussed in the weekly synchronous Zoom meetings that students should attend.

Definitions and Terminology

- *Ring* - page 223, also see definition of a *group* on page 16-17
- *Field*
- *Division ring* - page 224
- *Zero divisor* and *unit* - page 226
- *Integral Domain* - page 228
- *Subring* - page 228
- *Quadratic integer rings* - page 229

Notable Theorems, Propositions, Corollaries, and Facts

(Students should be able to prove these unless otherwise specified. Theorem, proposition and corollary numbers reset each chapter and will be referenced as chapter number period theorem number.)

- Proposition 7.1 - page 226
- Proposition 7.2 - page 228
- Corollary 7.3 - page 228

Examples

- Common numerical rings we are used to working with: the integers, rational numbers, real numbers, and complex numbers, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$, and $\mathbb{C}$ respectively (page 224)
- The quotient group $\mathbb{Z}/n\mathbb{Z}$, the ring of integers modulo n (page 224).
- The *Hamiltonian Quanternions* (page 224-225)
- Ring defined by any function $f : X \to A$ where X is any set and A is a ring. (page 225)
- Identify units and zero divisors in given rings: Examples 1-5 on page 226-227.
- Examples of Subrings: Examples 1-3, and 5 on page 228-229.
- Quadratic integer rings - page 229-230.