Math 5370 **ALGEBRAIC STRUCTURES** Fall 2016
Dr. Duval **Homework**
Thursday, October 20

Written homework. Due in writing, at the beginning of class,

Thursday, October 27. 4.44, 4.48, 4.55, 4.59, 4.89.

Warmup exercises. To present in class.

Tuesday, October 25. 4.58.

Thursday, October 27. 5.2, 5.6.

Reading assignment. These reading questions cover Sections 5.1 and 5.2. We should be discussing Section 5.1 on Tuesday and Section 5.2 on Thursday.

1. Give some examples of $\mathbb{Z}_m$ that are domains, and some that are not domains, and in each case, show why.
2. By Section 5.1, We have not yet (formally) defined polynomials (with real coefficients) as a commutative ring (but we will soon). Using your intuitive understanding of polynomials, do you think this ring is a domain? Why or why not?
3. When defining a fraction field, why do we have to start with a domain, instead of just a commutative ring that is not necessarily a domain?
4. Why is it important (on p. 193) to show that the cross-multiplication relation is an equivalence relation?
5. Translate Thm. 5.5(ii) to less abstract language in the special case where $D = \mathbb{Z}$.
6. Verify $x^7 + 2x - 1$ equals $3x + 6$ when each is as viewed as a function $\mathbb{Z}_7 \to \mathbb{Z}_7$ (as described on p. 196).
7. Why isn't R a subring of $R[x]$?
8. Let f be a polynomial. What is the difference between f and $f^{\#}$?
9. Give an example of a rational function, and how it fits the formal definition on p. 205.