Math 5370 **ALGEBRAIC STRUCTURES** Fall 2016
Dr. Duval **Homework**
Thursday, October 27

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

**Thursday, November 3.** 5.7, 5.8, 5.14, 5.27.

**Warmup exercises.** To present in class.

**Tuesday, November 1.** 5.9. 5.28.

**Thursday, November 3.** 5.33.

**Reading assignment.** These reading questions cover Section 5.3. On Tuesday, we should be discussing just the subsection on the definition, and on Thursday we will discuss most of the rest on the section. **Caution:** The subsection on "Extensions of Homomorphisms" is pretty technical, and may be hard to read on your own; still, even spending a few minutes skimming it may help you better understand the class discussion.

1. Show carefully, using the definition of homomorphism on p. 207 that there is a homomorphism from $\mathbb{Z}_2$ to $\mathcal{P}$ on p. 206. Then show the homomorphism is also an isomorphism.
2. Show carefully, again using the definition of homomorphism on p. 207, that Example 5.14(i) is really a homomorphism. Also, answer the question posed there: Is the homomorphism surjective?
3. Demonstrate how Lemma 5.17 works on Example 5.14(i) when $m = 4$.
4. Find the kernel and image of the homomorphisms in Examples 5.14(i), 5.15(i) and 5.15(ii). In each case, also demonstrate that the kernel and image satisfy the appropriate parts of Proposition 5.25.
5. Prove that the set of multiples of 3 is an ideal of the integers.