Definitions: You should be able to define and give examples of, or tell me something extra about, each of the following:

- Ring
- Field
- Integral Domain
- Division Ring
- Ideal
- Maximal Ideal
- Subring
- Unit element of a ring
- Units in a ring
- Zero Divisors
- Ring Homomorphism
- Kernel of a Ring Homomorphism
- Quotient Ring
- Distinction between $\mathbb{Z}/(n)$ and $\mathbb{Z}_n$
- Irreducible Polynomial
- Greatest Common Divisor of Two Polynomials
- Relatively Prime Polynomials

Theorems: You should be familiar enough with these to be able to use them to solve problems and you should be able to state the theorems which have names.

- Given that R is a commutative ring with an unit, then R/I is a field if and only if I is a maximal ideal.
- Homomorphism Theorems for Ring Homomorphisms, particularly the *First Homomorphism Theorem* and the *Correspondence Theorem.*
- If F is a field, then $F[x]$ is an Integral Domain.
- Given a field F and a polynomial $p(x) \in F[x]$, (p(x)) is a maximal ideal in $F[x]$ if and only if $p(x)$ is irreducible.
- *The Division Algorithm for Polynomials.*
- *Gauss's Lemma*
- *Eisenstein Criterion*

Problems:

- p.133 - 1,3,11
- p.139 - 1(use induction), 2, 3, 6, 8(Hint: Fields are Rings, and Rings are Abelian Groups.)
- p.146 - 1,2,3,5,18
- p.150 - 1,2,10,11
- p.163 - 1,3,10,11(Hint:Why do we know $r|a_0$ and just try factoring it.), 12
- p.170 - Look at Examples 1-5
- p.171 - 1,2,3,4 (Compare to Exmaple 4),5(Compare to Example 5)