Name: _____

Reading Questions

1. Make sure you know the definitions of the following terms: polynomial over a ring R with indeterminate x, coefficients, leading coefficients, monic polynomial, degree of a polynomial, addition and multiplication of polynomials, zero/root of a polynomial, gcd of two polynomials, relatively prime polynomials, evaluation homomorphism.

2. Make sure you know the statements of the main results: Theorem 17.3 and Proposition 17.4 on the structure of polynomial rings, Theorem 17.6 and Proposition 17.10 on the "arithmetic" of a polynomial ring over a *field*, and Corollary 17.8 and Corollary 17.9 about roots/zeros of polynomials.

3. True or false, with reasons.

   (a) The degree of the zero polynomial is zero.

   (b) Let R be a commutative ring with identity and $p, q \in R[x]$. Then $\deg(pq) = \deg(p) + \deg(q)$.

   (c) Let R be a commutative ring with identity, $\alpha \in R$, and ϕ_α the evaluation homomorphism $\phi_\alpha : R[x] \to R$. The kernel of ϕ_α consists precisely of polynomials in $R[x]$ having α as a root.

   (d) Let F be a field, $\alpha \in F$, and ϕ_α the evaluation homomorphism $\phi_\alpha : F[x] \to F$. The kernel of ϕ_α consists precisely of polynomials in $F[x]$ having $x - \alpha$ as a factor in $F[x]$.

   (e) $\mathbb{Q}[x]$ is an integral domain but not a field.

4. What struck you in this reading? What is still unclear? What remaining questions do you have?