

Math 417 - Test 3 - Material for Review - 4/29/19.

1. Exam 3 is 4/26/19 @ 10am in class. Closed book/notes except for 3"x5" card that you fill in. Material is taken from HW 8, 9, 10, Fraleigh sections 18, 19, 20, 22, 23.

2. Definitions: Rings, rings with multiplicative identity, integral domains, zero divisors, units; polynomial rings and products of rings; ring homomorphisms

3. Basic Examples: $\mathbb{Q}, \mathbb{Z}, \mathbb{R}, \mathbb{C}, \mathbb{Z}/n\mathbb{Z}$ (special role played when $n=p$ is prime), $\mathbb{R}[x]$ and $\mathbb{F}[x]$ where \mathbb{R} and \mathbb{F} are rings, fields, $\mathbb{R}_1 \times \mathbb{R}_2$, ring homomorphisms especially from $\mathbb{Z}/m\mathbb{Z}$ to $\mathbb{Z}/n\mathbb{Z}$.

4. Things to know: Fermat's Theorem, Euler's Theorem, the last digits mod 100, definition and playing with primitive roots. Factorization in polynomial rings. The division algorithm in $\mathbb{F}[x]$, reducible and irreducible polynomials, especially over a field, zeros of polynomials (Thm 23.10, 23.12). How to solve $x^2 \equiv 1$ or $x^2 \equiv k$ mod m for small m (look mod p^k ; use Chinese Remainder Theorem)

5. Not at test: Eisenstein criterion, periodic table, characteristic not zero, rings of matrices, proof of existence of primitive roots, solving $ax \equiv b$ mod m unless a, b, m are small and it's part of another problem.