

NUMBER THEORY: Remarks on FINAL Exam

Sections Covered: 2.1–4, 3.1–3, 4.2–3, 5.3–4, 6.1, 7.2,3,5, 8.1,2,4, 9.1–3, 10.2, 14.2–4

Note: You are only responsible for topics which were covered in class.

Results to Know Name and Statement

Division Algorithm	Euclid's Lemma
Euclidean Algorithm	Fund. Theorem of Arithmetic
Chinese Remainder Theorem	Wilson's Theorem
Fermat's Little Theorem	Euler's Generalization of FLT
Euler's Criterion	Gauss' Lemma
Quadratic Nature of 2	Quadratic Reciprocity Law
Even Perfect Number Theorem	Fermat-Pell Equation

Computations to Know

Finding gcd's and expressing $\gcd(a, b) = ax + by$

Divisibility by 3, 9, 11 and finding missing digits

Solving linear Diophantine equations

Solving linear and quadratic congruences

Finding last digit or 2 of a number

Calculating $\varphi(n)$, $\tau(n)$, $\sigma(n)$

Calculating the order of an integer (mod n)

Finding primitive roots (mod n)

Find the index of a relative to r (mod p)

Using Laws of Indices to solve congruences

Finding quadratic residues and nonresidues of p

by definition, using Legendre symbols, using primitive roots

Calculating Legendre symbols

by definition, by Euler's Criterion, by Gauss' Lemma,

by the Quadratic Reciprocity Law, by the Quadratic Nature of 2

Using residues to solve quadratic congruences

Evaluating finite and periodic continued fractions

Expressing rational numbers and \sqrt{d} as continued fractions

Proofs to Know

Euler's Criterion

The Even Perfect Number Theorem

Study class notes, homework, tests, practice exams.