

Properties of Finite Fields

Theorem 1 \mathbb{Z}_p is a field if and only if p is prime.

Theorem 2 Let p be a prime and $n \in \mathbb{Z}^+$. Then there exists a finite field F with p^n elements.

Theorem 3 For any prime p and $n \in \mathbb{Z}^+$, there is (essentially) only one field with p^n elements.
(The splitting field of $x^{p^n} - x$ over the field \mathbb{Z}_p .)

References

- *Elementary Modern Algebra*, R Thompson, Scott, Foresman, & Co.
- *Modern Algebra: A First Course*, H Hollister, Harper & Row.
- *Introduction to Modern Algebra*, H McCoy, Allyn and Bacon.
- *Modern Algebra*, F Ayers, Schaum's Outline Series, McGraw-Hill.
- *Basic Algebra I*, N Jacobson, Freeman.
- <http://mathworld.wolfram.com/FiniteField.html>
- <http://www-math.cudenver.edu/~wcherowi/courses/finflds.html>