

MATH 7290 Homework 3 - Spring 2013
Due Tuesday, Mar. 5 at 1:30

The notation “Koblitz A.B.C” means Problem C from Chapter A, Section B of the text-book.

[Thurs., Feb. 14]

1. Koblitz 1.5.4. Note that this problem was important in showing that the map from \mathbb{C}/L to $E(\mathbb{C})$ is *surjective*.
2. Koblitz 1.6.1.

[Tues., Feb. 19]

Suggested. Koblitz 1.6.9 – warm-up for the following problems.

3. Koblitz 1.6.10.
4. Koblitz 1.6.11.

Suggested. Koblitz 1.6.12 – real points on elliptic curves.

[Thurs., Feb. 21]

5. Koblitz 1.9.4.
6. In this problem you will enumerate the number of points in projective space without considering its affine subspace.
 - (a) How many elements in F_q are invertible?
 - (b) How many non-zero points are in \mathbb{F}_q^{n+1} ?
 - (c) Explain why $|\mathbb{P}^n(\mathbb{F}_q)|$ is equal to part (b) divided by part (a). Calculate this expression and compare to the formula from lecture,

$$|\mathbb{P}^n(\mathbb{F}_q)| = q^n + q^{n-1} + \cdots + 1.$$

[Tues., Feb. 26]

7. Prove that the Zeta function for the projective line $L : x + y + 1 = 0$ over $\mathbb{P}^2(\mathbb{F}_q)$ is

$$Z(L/\mathbb{P}^2(\mathbb{F}_q); T) = \frac{1}{(1-T)(1-qT)}.$$

[Thurs., Feb. 28]

8. Koblitz 2.1.1.
9. Koblitz 2.1.4. Note that $\chi_2 = \overline{\chi_2}$.