IAP 2006 18.095 Problem Set 4

Due 27 Jan 2006 Friday

If p is a prime number, write F_p for the field of integers modulo p.

1. We showed in the lecture that there are exactly $p(p-1)/2$ pairs of elements (b, c) in F_p so that the polynomial $x^2 + bx + c$ is irreducible.
List these polynomials for $p = 2$ and $p = 5$.

2. Prove that there are exactly eight irreducible cubic polynomials $x^3 + ax^2 + bx + c$ with coefficients in F_3, and list all of them.

(Hint: a reducible cubic polynomial has to have a root in F_3. This means that its coefficients have to satisfy one of three linear equations.)