Re: roots of polynomials on a field

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- *From*: Timothy Murphy <tim@xxxxxxxxxxxxxxxxxxxxxxx>
- *Date*: Sun, 19 Jun 2005 12:39:21 +0100

Li Yi wrote:

> We know that a polynomial of degree n has at most n roots in a field.
>>>From the finite field theory, we know that the splitting field of
> x^(p^n)−x on F(char F = p) has the order of p^n. The proof says that
> x^(p^n)−x has p^n distinct roots on F and then it says that those roots
> form a field. The conclusion follows.
>
> My question is, why does f(x) = x^(p^n)−x has p^n roots? I know that
> its roots are distinct since f and f' are coprime.

Because it is of degree p^n, and a polynomial p(x) of degree N over k
has N roots
(in the algebraic closure of k, or in the splitting field of p(x)).

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- ***References***:
  - ***roots of polynomials on a field***
    - *From:* Li Yi

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