Re: probability of real factorization.

Source: http://sci.tech−archive.net/Archive/sci.math/2005−12/msg00064.html

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- *Date*: 30 Nov 2005 15:53:14 −0800

Robert Israel wrote:
> In article <1133353263.758335.202840@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx>,
> <pauldepstein@xxxxxxx> wrote:
> >Let n be a fixed positive integer.
> >
> >Let N also be a positive integer.
> >
> >Randomly select a real monic polynomial in Z[x] of degree n such that
> >all coefficients have absolute value less than N. (Select such that
> >all eligible polynomials have equal probability of being chosen.)
> >
> >As N tends to infinity, what is the limit of the probability, p_n,
> >that the selected polynomial factors completely over the reals.
> >
> >For n = 2, p_n = 1 I think.
>
> For n = 3, the discriminant of x^3 + a x^2 + b x + c is
> D(a,b,c) = −27 c^2 + 18 a b c + a^2 b^2 − 4 a^3 c − 4 b^3.
> The cubic has three real roots iff D(a,b,c) >= 0.
> Note that if |a|, |b|, |c| <= N,
> D(a,b,c) = a^2 (b^2 − 4 a c) + O(N^3)
> so as N −> infty, the probability of three real roots should
> approach the probability that b^2 − 4 a c > 0, which is
> 41/72 + ln(2)/12 (see Rob Johnson's posting).

I'm posting without doing much thinking here, but...

It looks like the answer for arbitrary degree n might be
(41/72 + ln(2)/12)^[n/2] where [n/2] is the integer part of n/2.

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- ***Follow−Ups***:
  - ***Re: probability of real factorization.***
    - *From:* Robert Israel

- ***References***:
  - ***Re: probability of real factorization.***
    - *From:* Robert Israel

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