

Worksheet 20

Math 391, Abstract Algebra

Wednesday, November 18, 2020

In lecture we proved the *rational root test*, which is Proposition 3.1 on page 105: Let

$$f = a_n x^n + \cdots + a_1 x + a_0 \in \mathbb{Z}[x]$$

be a polynomial with integer coefficients. If f has a rational root r/s , where we've written the fraction in lowest terms, then r divides the constant term a_0 , and s divides the leading coefficient a_n .

1. Find the rational roots of $f = 2x^4 + 3x^3 + 4x + 6$. You'll need to plug in ten different values of x , so work together to figure out what those values are, and then divide up the work of plugging them in.
2. Conclude that f factors in $\mathbb{Q}[x]$ as a linear factor times an irreducible cubic factor. (Why is the cubic irreducible? Because of §3.1 #8 on the upcoming homework.)