6.6 – 6.7 Real Zeros of Polynomials

Rational Root Theorem

If a polynomial has integer coefficients, then every rational zero has the form:

Possible zeros

$$\pm\frac{p}{q} = \pm\frac{\text{factor of the constant}}{\text{factor of the leading coefficient}}$$

with no variable

I. List All Possible Rational Zeros

EXAMPLES:

1. $f(x) = 1x^3 + 2x^2 - 5x + 6$

p — factors of constant term: 1 2 3 6

q — factors of leading coefficient: 1

$\pm\frac{p}{q}$ — possible rational zeros:

$\pm\frac{1}{1}$ $\pm\frac{2}{1}$ $\pm\frac{3}{1}$ $\pm\frac{6}{1}$

± 1 ± 2 ± 3 ± 6

2. $f(x) = 2x^3 - x^2 + 5x + 6$

p: 1 2 3 6

q: 1 2

$\pm\frac{p}{q}$: $\pm 1, \pm 2, \pm 3, \pm 6, \pm\frac{1}{2}, \pm\frac{3}{2}$

3. $f(x) = 6x^4 + 35x^3 + 35x^2 - 55x - 21$

p: 1 3 7 21

q: 1 2 3 6

$\pm\frac{p}{q}$: $\pm 1, \pm 3, \pm 7, \pm 21, \pm\frac{1}{2}, \pm\frac{3}{2}, \pm\frac{7}{2}, \pm\frac{21}{2}$

$\pm\frac{1}{3}, \pm\frac{7}{3}, \pm\frac{1}{6}, \pm\frac{7}{6}$