

# Rational Function Root Theory

When a polynomial with integer coefficients has a rational root,

$$P(X) = a_n X^n + a_{n-1} X^{n-1} + \dots + a_0$$

then a root must be

**H/L** where **H** is the factor of  $a_0$ , and **L** is the factor of  $a_n$

Ex.  $P(X) = X^3 - X^2 + X + 3$  Find a rational root if exists.

The factor of 3 is  $\pm 3, \pm 1$ , and the factor of 1 is  $\pm 1$ .

The possible real root is  $\pm 1, \pm 3$

Verify each possible root and obtain -1. It exists