Dividing by Polynomials

The process of dividing by polynomials is very similar to the process we use to long division of rational numbers. If the divisor is a monomial (one term), the process is simplified significantly. If the divisor contains more than one term, the process can be time consuming, but it is not too difficult if we remember some key steps.

Dividing a polynomial by a monomial. If the divisor is a monomial, we will divide each term in the dividend by that monomial term and then simplify.

Example:

$x^2 - 2x + 1$

$-2x^3 + 0x^2 + 4x$

$2x^3 - 6x^2 + 6x - 14$

$-5x^2 + 6x - 16$

We use the same long division brackets [redacted] fraction.

Synthetic Division: Synthetic division is a special way to divide polynomials. It is a great deal faster than long division, but it can only be used with certain divisors. You can only use synthetic division with divisors of the form x – k (where k is a constant). We will work through an example.

$$\frac{\left(x^4+3x^2+6x-10\right)}{x+2}$$

Notice that the divisor is of the form x – k

$$\begin{array}{r|rrrrr} 1 & 0 & 3 & 6 & -10 & -2 \\ & -2 & & & & \\ \hline 1 & -2 & & & & \end{array}$$