7.4 Partial Fractions

In 2.6 we learned how to break down a polynomial of higher degree using our factoring skills and synthetic division.

IE: Factor: $x^2 + 3x + 2$

Breaking complicated expressions into less complicated expressions is a mathematicians most important tool. Today we are going to break down rational functions.

Write the sum as a single rational function

$$\frac{3}{x-4} + \frac{2}{x+3}$$

Rational Functions

Unlike polynomials which break down into a **product** of factors, rational functions break down into a **sum** of fractions. This is called **Partial Fraction Decomposition**

$$\frac{3x-4}{x^2-2x}=\frac{2}{x}+\frac{1}{x-2}$$

Each fraction in the sum is called a partial fraction the entire sum is the partial fraction decomposition.

Find the partial fraction decomposition of:

$$\frac{5x-1}{x^2-2x-15}$$

Find the partial fraction decomposition of:

$$\frac{3(x-1)}{x^2+5x+4}$$

Find the partial fraction decomposition of:

$$\frac{7}{(x-2)(x-3)}$$