Partial Fractions

by

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In Calculus, there are several procedures that are much easier if we can take a rather large fraction and break it up into pieces. The procedure that can decompose larger fractions is called Partial Fraction Decompostition. We will proceed as if we are working backwards through an addition of fractions with LCD.

EXAMPLE 1: For our first example we will work an LCD problem frontwards and backwards. Use an LCD to complete the following addition.

$$\frac{3}{x+2}+\frac{5}{x-1}=$$

The LCD is (x + 2)(x – 1). We now convert each fraction to LCD status.

On the next slide we will work this problem backwards

$$\frac{3}{x+2}+\frac{5}{x-1}=$$

$$\left(\frac{x-1}{x-1}\right)\frac{3}{x+2}+\frac{5}{x-1}\left(\frac{x+2}{x+2}\right)=$$

$$\frac{3x-3+5x+10}{(x-1)(x+2)}=$$

$$\frac{8x+7}{(x-1)(x+2)}$$

Find the partial fraction decomposition for: $\frac{8x+7}{x^2+x-2}$

As we saw in the previous slide the denominator factors as (x + 2)(x – 1). We want to find numbers A and B so that:

$$\frac{8x+7}{x^2+x-2}=\frac{A}{x+2}+\frac{B}{x-1}$$

The bad news is that we have to do this without peeking at the previous slide to see the answer. What do you think will be our first move?

Congratulations if you chose multiplying both sides of the equation by the LCD. The good news is that, since we are solving an equation, we can get rid of fractions by multiplying both sides by the LCD.