**Integration by Partial Fractions**

Integration by partial fractions helps integrate complicated ratios of polynomials by expressing them as simpler fractions. By simplifying equations involving polynomials in the numerator and in the denominator this way, we can integrate each separate part individually.



Take the equation above as an example. Begin by factoring the denominator completely.



Set each part of the denominator as a separate equation, each with its own numerator, expressed as a simple variable. It doesn’t matter which variable goes over which part; the final answer will still be the same.



For the next step, write an equation in which the numerator from the original integral is set equal to a numerator that would result from making a common denominator from the separate parts. In this step, each variable (A, B, C) in the numerator will be multiplied by each other denominator.



Now, solve for A, B, and C. To solve for A, let x equal a number that would cause the B and C parts of the equation to equal zero. In this case, x=0 would fulfill this requirement. Once B and C are equal to zero, simply solve for A.







B and C can be solved for using the same strategy. In this equation, B=3 and C=2. Now, substitute each value of the variables into the integral formed from parts.



Finally, each part can be integrated separately, to yield a final answer. 