Partial Fractions and Inverse Laplace Transform

In order to use the Laplace transform we need to be able to invert it and find \( f(t) \) when we’re given \( F(s) \). Often this can be done by using the Laplace transform table. So for example, if \( F(s) = \frac{1}{s - 5} \) then \( f(t) = e^{5t} \).

More often we have to do some algebra to get \( F(s) \) into a form suitable for the direct use of the table. Our main technique for doing this is the partial fractions decomposition. You probably saw this before in calculus as a method for computing integrals.

First we will learn how to do partial fractions in a straightforward algebraic way using the method of undetermined coefficients. Next we will learn the Heaviside coverup method which makes some of the algebra easier.