Laplace Transform First Order Equation

This is the start of Laplace transforms. We will see in this lecture about Laplace transform to first ode. The steps are easy and pretty quick. Then we will come second order equations.

What is Laplace Transform is? Suppose the function is $f(t)$. Here is the transform.

$$\boxed{F(s) = \int_0^\infty f(t)e^{-st}\,dt}$$

We can also calculate

$$\mathscr{L}[\frac{dy}{dt}] = s\mathscr{L}[y] - f(0) = sF(s) - f(0)$$

It turns out that we taken a differential equation and we produced an algebra equation. That's the point of the Laplace transform.

We can easily get an answer - with s variable, the s domain. We have got to get back to the origin domain using inverse Laplace transform and give us back $y(t)$.

 For the first order differential equations, we need to memorize a transform

$$\mathscr{L}[e^{at}] = \frac{1}{s-a}$$

And we can use it to execute the Inverse Laplace transform to find out the origin function.