B4.2 Homogenous Differential Linear Equations

For a 2nd order Linear differential of the form:

- $ay'' + by' + c = 0$, this is refered to as the homogenous part of the more general form
- a, b, and c are constant coefficients for this differential linear equations

To find the solution to this equation, we must convert it to the characteristic equation:

$ar^2 + br + c = 0$, and solve for the corresponding r values which satisfy the equation

If r has 2 REAL values, we can find its homogenous solution as:

$$y(t) = C_1 e^{r_1 t} + C_2 e^{r_2 t}$$

If r has 1 REAL value, we can find the homogenous solution as:

$$y(t) = C_1 e^{rt} + C_2 t e^{rt}$$

we multiply by a factor of t

To go about finding the specific value of C_1 and C_2 we come to the notion of the initial value problem, where we look at our solution and plug and chug until we see the appropriate C_1 and C_2

Linear Independece: $y_1(t)$, $y_2(t)$ are linearly independent on the interval I iff neither is a constant multiple of the other. $y_1(t)$, $y_2(t)$ are linearly dependent on I if one of them is a constant multiple of the other on all I