4. Higher Order LDE - Intro

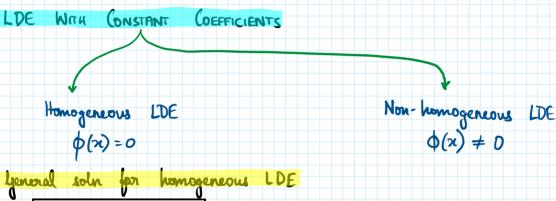
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HIGHER DROER LINEAR DE

$$a_{n} \frac{d^{n}y}{dx^{n}} + a_{n} \frac{d^{n-1}y}{dx^{n-1}} + a_{n} \frac{d^{n-2}y}{dx^{n-2}} + ... + a_{n} y = \phi(x)$$

Conditions for a DE to be linear:

- · Dependent voriables and derivatives -> highest power should be 1
- · Dependent vouiable not in product with its derivative(s)



Joking
$$\frac{d}{dx} = D$$
 $\frac{d^2}{dx^2} = \frac{d}{dx}(\frac{d}{dx}) = D^2$
 $\Rightarrow a_0 D^2 y + a_1 D y + a_2 y = 0$
 $(a_0 D^2 + a_1 D + a_2) y = 0$
 $F(D) \cdot y = 0$

where $F(D) = a_0 D^2 + a_1 D + a_2$

by Sinear differential operator

An n^{th} order DE should have n' arbitrary constants in its GS