

# Chapter 4:

## 4.2: Homogeneous Eq with Constant-Coeff

If you have a homogeneous Eq with a Third or higher Order Solve it by:

1- finding roots of aux Equation

# of Roots = the order of the Equation

2- roots can be real numbers or Complex numbers

3- Make an equation Exactly as ch 3

real numbers:- not repeated

$$y = c_1 e^{s_1 t} + c_2 e^{s_2 t} + \dots$$

repeated

$$y = c_1 e^{s_1 t} + c_2 t e^{s_1 t} + \dots$$

complex

$$y = c_1 e^{\alpha t} \sin \beta t + c_2 e^{\alpha t} \cos \beta t + \dots$$

### Complex Number Review

$$r = (a)$$

↑ let's say it's a constant

Now  $\boxed{a = a + 0i}$   $\rightarrow$  length  $= \sqrt{a^2 + 0^2}$

So  $\cos \theta = a$   
 $\sin \theta = 0 \rightarrow$  find  $\theta$

Then

write  $i(\theta)$   $\frac{1}{r}$

$$a = |a| e^{i(\theta)}$$

length

$$a = |a|^{\frac{1}{r}} e^{\frac{i\theta + 2\pi k}{r}}$$

$k \in \mathbb{Z}$

\* if you have Repeated solutions  
multiply with  $t$

~~#~~  $\therefore Y_p \rightarrow$  Char  $\rightarrow 50$   $6$

$4t+5$   $\rightarrow$   $\text{ans}$

Take this as 1 Polynomial.

In 43 you have to find  $Y_p$  same as 35