$$E_{x}: y^{(3)} - 625y''' = 0$$

$$= r^{3}(r-5)(r^{3}105) (r^{4}25)$$

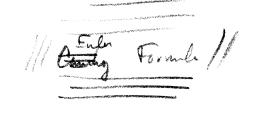
Linear Independence:

The way to do this is via linear combinetim ...

Algebra for complex conjugate roots

= x + iy

= x - iy



If that the tweel

Z=x+cy , C=a+ib

andogy with the plan IR'

C+7 = (x+0) + 1 ( y+4)

Euler Equeton

We now can solve any equation of the form ay"+ by + cy = 0

or even a, y" + a, y " + = + An y = 0

un factured.

Det A second order DE is called an Fulu Equation leaveful with 7 vs y dx'y"+ pxy + 8y=0

Fx: x'y" 6xy + 10y =0

Ex: x'y"- 9xy' + 25y = 0

Let's reason an way though the! ay"+ by '+ey= and y=er due to y'ny and y"ny=1 y=16

Now let's consider the Enter equation.

ax'y" + bxy + cy = 0

x2xr-3~ xxr-1~ xoxr xy" xy' xy

$$= x^{r} (r^{2}r - 6r+10)$$

$$= x^{r} (r^{2} - 7r + 10)$$

$$= x^{r} (r-3)(r-4) = 0$$

$$Ex : x'y'' - 9xy' + 27y = 0$$

$$x'(r(r-1) x^{r-1} - 9x + x^{r}) + 17x'$$

$$= x'(r(r-1) - 9r + 7r) = 0 \Rightarrow r'' = 10r + 7r = 0$$

$$\Rightarrow (r-r)^2 = 0$$

=) 
$$y_1 = x^{5}$$
  
=:  $R.0.0$ .  $y = x^{5}u$   
 $y' = 5x^{4}u + x^{5}u'$   
 $y'' = 20x^{3}u + 10x^{4}u' + x^{5}u''$ 

$$= 2 \times (20 - 45 + 15) u + x (10 - 9) u' + x^{3} u'' = 0$$

$$y = x^{5} (c_{1} \ln |x| + c_{2} x^{5}$$

$$= c_{1} x^{5} \ln |x| + c_{2} x^{5}$$

## Comply !