4 1			
		1	71
	ni	1	-11
		_	

Date		
Page		

Dependent Independent variables :> The variable where Value is origined is called Independent variable and the variable whose value is obtained wiret anigned value is called dependent Variable. If I: A -> B be any function then + XEA, I unique yEBSt.

y= f(x)

dependent > Independent variable

variable

Differential Equation: In equation Containing dependent variable, Independent variables and the derivatives of dependent variables wint Independent variables.

If y = f(x) If y= f/x, t)

Then $\frac{dy}{dx} + \frac{3im}{3x} = \frac{3y}{3x} + \frac{3y}{3t} = \frac{3sint}{3}$

 $\frac{dy}{dx} = \frac{y-x}{2x}$ $\frac{\partial y}{\partial x} + \frac{\partial y}{\partial t} = x+t$

Oldinary Diff Epur Partial Diff Equr.
(1908)

Onder of DDE:> The onder derivative in the differential Equation is called the order of differential Equation.

Degoice of ODE: The highest power of the highest derivative in the differential Equi provided all the desiratives are in notwal power.

Eg. y'+ Sy = Sinn Onder -1, degree -1

y"+ y" = 2 0 yden-2

=> y"-x=-\quad -\quad \quad \q

=) (y"-x)= (-1917 #

$$(y'')^{2} + x^{2} - 2xy'' = y'$$

$$\Rightarrow 0 \text{ when } = 2, \text{ degree } = 2$$

I These two are not same as only finitely many terms Should be there in an equation.

3) degree of this DOE is not deffined.

y' + |y| = x onder = 1, degree = 1

(2) Power of y' is not natural power)

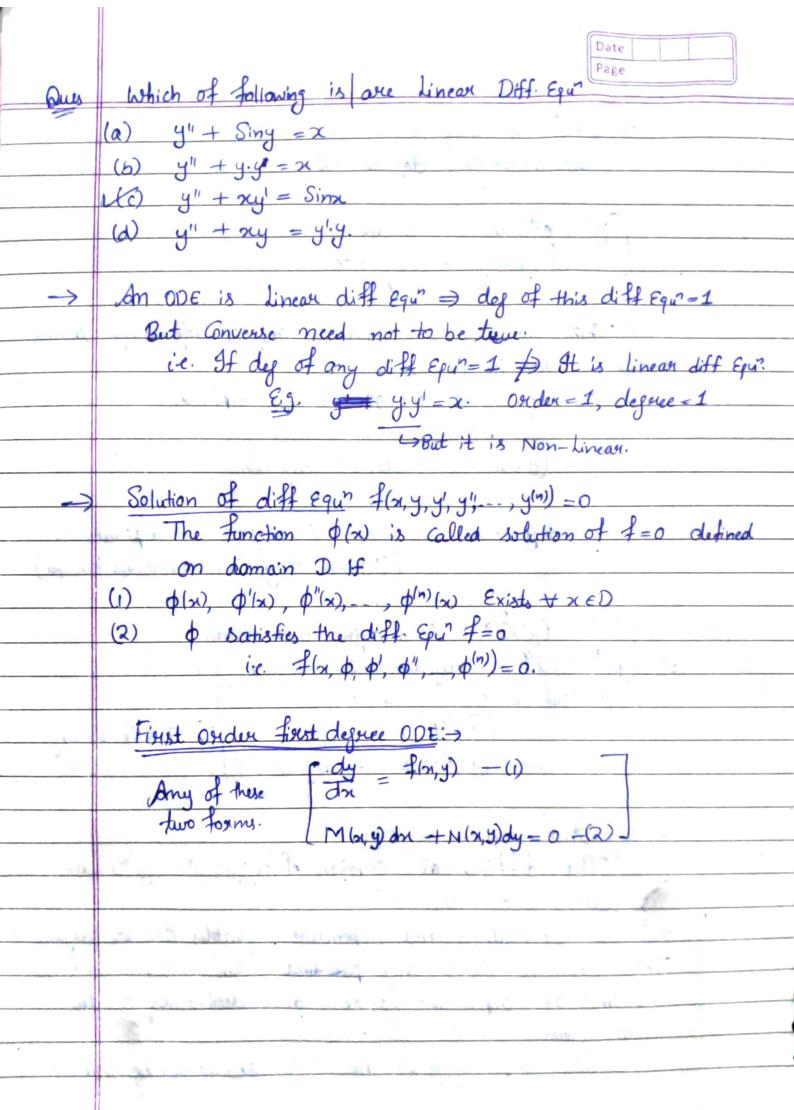
Due $(y'')^{\frac{3}{2}} = (y'')^{\frac{2}{3}}$ Find degree and orden. If we do $(y'')^9 = 1$ $(y'')^{64} = 1$ $(y'')^5 = 1 \Rightarrow \text{degene} = 5$ This is whom?

Linear and Non-linear ODE:>

The differential equation of (x, g,y', y'! - y'n) =0 is colled linear ODE If

all the derivatives and dependent variables are of degree 1. There does not Exist any paradust term which contains (2) product of dependent variables and desiratives are two derivatives.

E.g. y.y' oxy.y" ox y'.y" should not be present.



Foundation of differential Equi-

(3)
$$y = C \cos(Pt - a)$$
: P: fixed Constant.

Find order and degree of following ODE's.

$$[1+(y')^2]^{1/2} = \chi^2 + y$$

(5)
$$y' = Siny$$

(6) $(1+y')^{1/2} = y'!$

Date	
Page	

Should oneil

flag = 3/2) - function of one variable x alone then fdy = sox +c

=) A(y)= B(x)+c.

y'' - 3y + 6 = 0, a is fixed Constant: Find gen sol? $\frac{dy}{dx} = 3y - 6 \Rightarrow \frac{dy}{3x - a} = dx$, $\frac{dy}{dx} = -(1)$

For you; du =0 and the given diff Epur is satisfied

7 Joan is a solution.

any substructy anyteent.

So Integrating 10, we get

Soft of John to

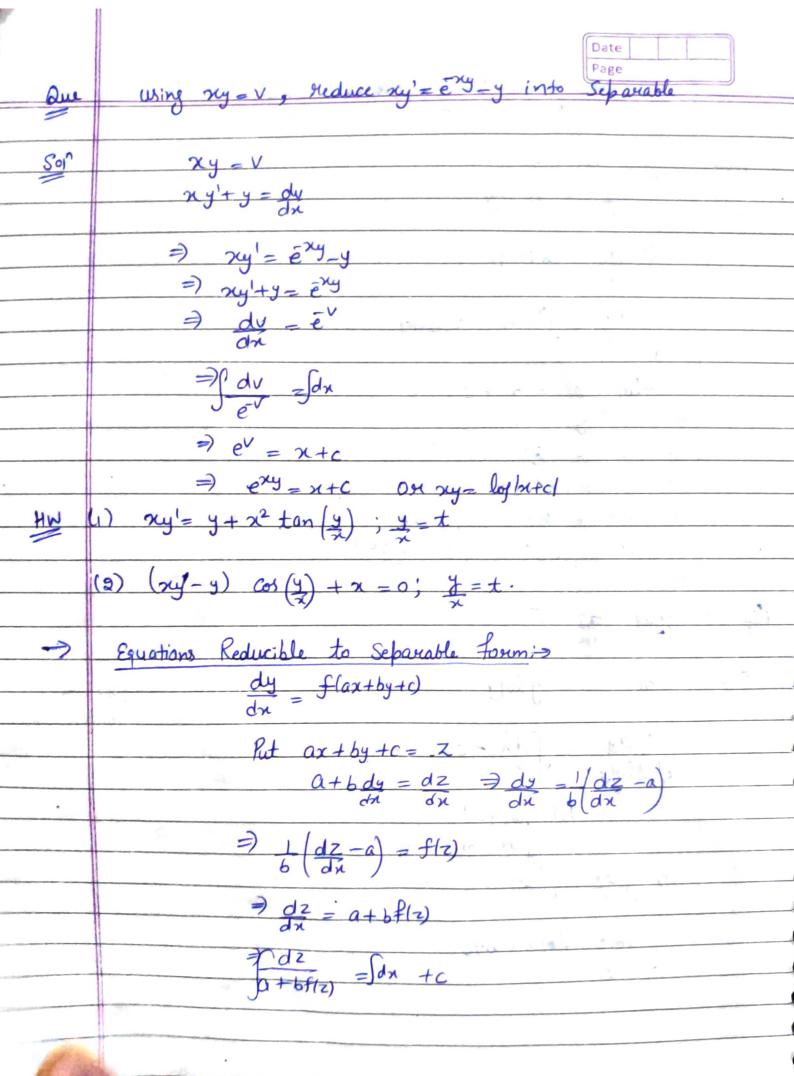
Total and a state

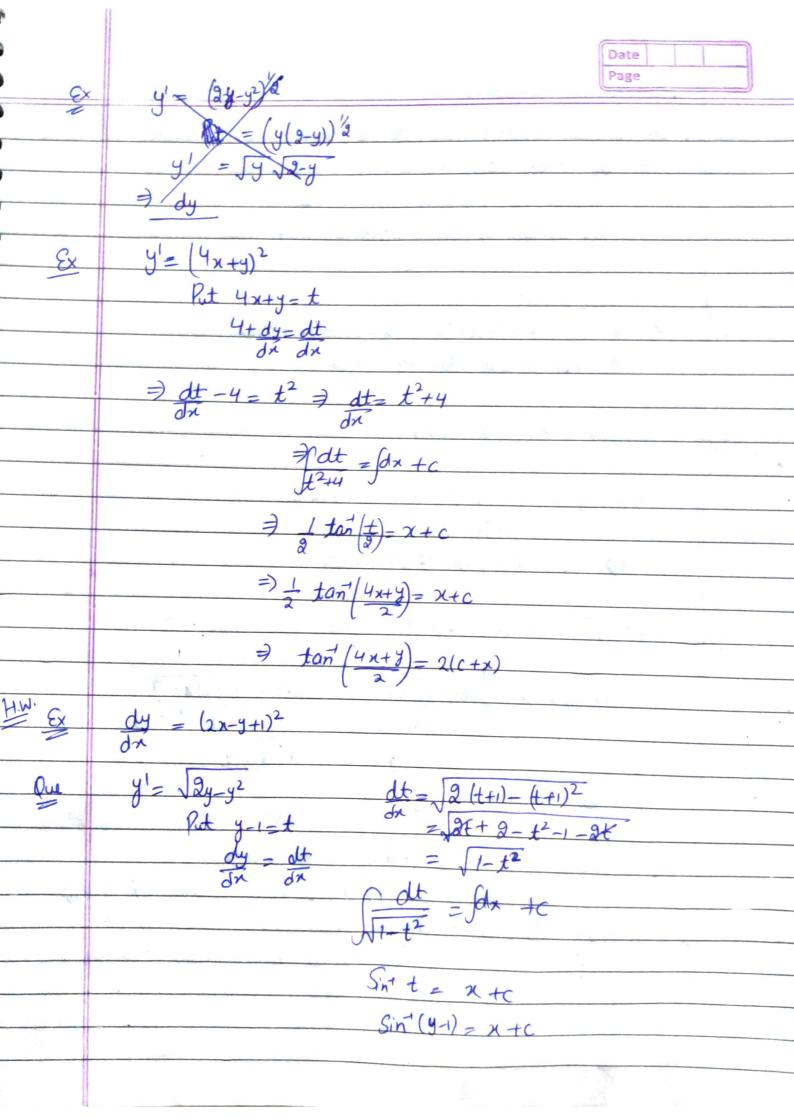
9 24-0- K. e2x when kate 4.

Off
$$y = Ce^{2n} + a$$
; where $c = \frac{K}{2}$.

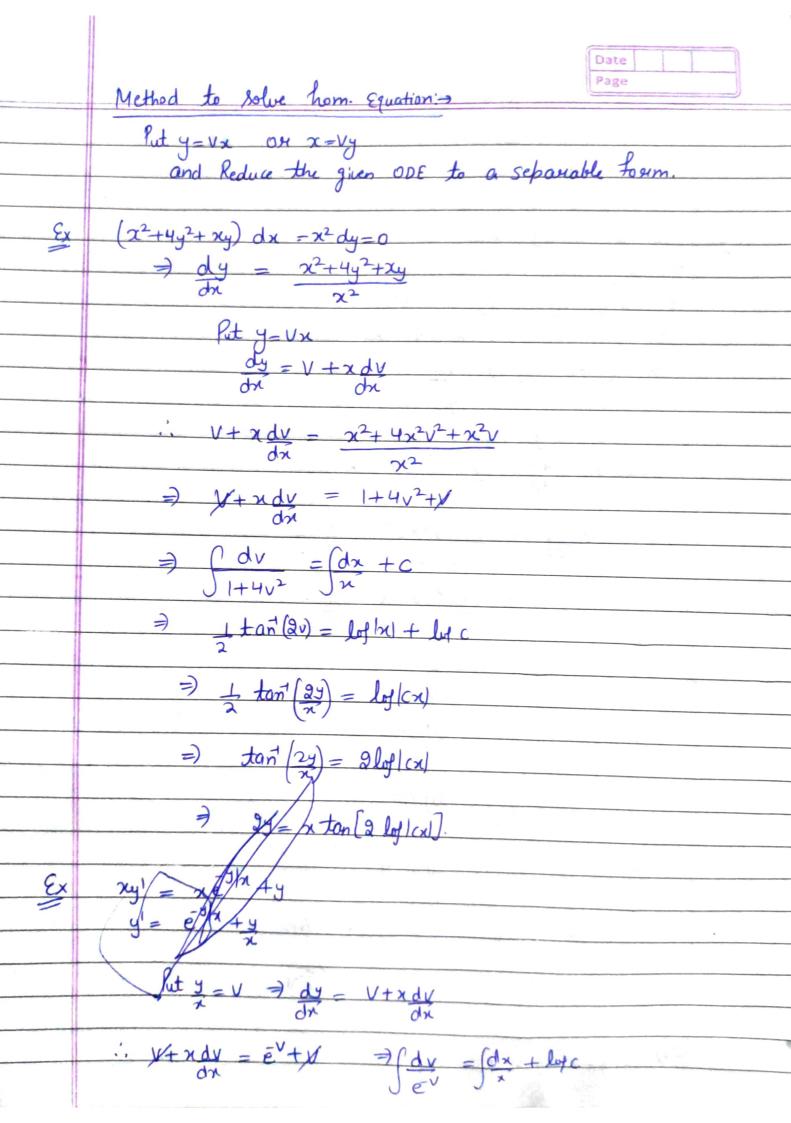
$$\frac{y' + xy = x}{dy} = x - xy$$







	Date Page
	Homofeneous function:
	A function f(x,x) is said to be homofeneous function of deg n
	If by substituting $x = \lambda x$, $y = \lambda y$ Paraduces
	$f(\lambda x, \lambda y) = \lambda^n f(n, y)$
	Here n Can be an Integer on any real number.
6.9	$f(x,y) = \chi^2 + y^2$
	$f(dx,dy) = d^2x^2 + d^2y^2 = d^2(x^2 + y^2) = d^2f(x,y)$
	⇒ homogeneous fun of def a.
<u>E.g</u>	$f(x,y) = \frac{\chi^2 + y^2 + \chi y}{\chi^2 - y^2}, \chi + y$
	A V
	$\frac{f(x, dy) = \frac{1^2x^2 + \lambda^2y^2 + \lambda^2xy}{1^2x^2 - \lambda^2y^2} = \lambda^2 \frac{f(x, y)}{1^2x^2 - \lambda^2y^2}$
	a hom. function of degree o.
00	
<u>E9</u>	$f(x,y) = x^3 \log \sqrt{x+y}$
	$\begin{cases} \sqrt{x-y} \\ \sqrt{x-y} \\ \sqrt{y-y} \\$
	$f(\lambda x, \lambda y) = \lambda^3 x^3 \left \log \sqrt{\lambda x + \lambda y} \right = \lambda^3 x^3 \left \log \sqrt{\lambda x + y} \right $
	$\left[\begin{array}{c} \left(\sqrt{\lambda}x-\lambda y\right) \\ 13 \end{array}\right]$
	$= d^3 f(x,y)$
	=) home function of defree 3.
	11 P
	Homogeneous firest onder differential equation:
	y= f(x,y) is called a hom equation if f(x,y)
	is a hom. function of degree 0. Eg. y'= 23+y3+22y is a homogeneous equation.
	$y = \frac{\chi^2 + \chi^2}{\chi^3 + \chi^2}$ is a homogeneous Equation.
-	



Date Page

$$\Rightarrow e^{V} = \log x + \log c$$

$$\Rightarrow e^{V} = \log |Cx|$$

$$\Rightarrow e^{Y/x} = \log |Cx|$$

$$\begin{cases} (x+y)(xy'-y)y = x^3. \end{cases}$$

$$\Rightarrow (x^2y' - xy + xyy' - y^2) y = x^3$$

$$\frac{1}{2}$$
 $\frac{1}{2}$ $\frac{1}$

$$=$$
 $y'(x^2y+xy^2) = x^3+y^3+xy^2$

$$\frac{y' = \chi^3 + y^3 + \chi y^2}{\chi^2 y + \chi y^2}$$

$$\frac{So \ V + x \, dV = \ x^3 + V^3 x^3 + V^2 x^3}{V x^3 + V^2 x^3}$$

$$\Rightarrow \chi dv = \frac{1 + v^3 + v^2}{\sqrt{v^2 + v^2}} - v$$

$$\Rightarrow \int (v+v^2) dv = \int \frac{dx}{x} + \frac{lu(c)}{x}$$

$$\frac{1}{2}\left(\frac{V^2+V^3}{2}-\frac{|y|cx}{2}\right)$$

$$\Rightarrow \frac{1}{2} \left(\frac{y}{x} \right)^2 + \frac{1}{3} \left(\frac{y}{x} \right)^3 - |y| |cx|$$

$$\frac{1}{2}$$
 $3xy^2 + 9y^3 = 6x^3 \log(x)$ Am.