Solve: (x+2y+2)dx + (2x-y-3)dy = 0

Me have, Mdx + Ndy =0

then, the solution is exact D.E.,

F Mdx + F Ndy = 0

f(x+2y+2)dx+((2x-y-3)dy =0

x2+2yx+2x+2xy-y2-3y=0.

 $\int M dx = \int (x+2y+2) dx = \frac{x^2+2xy+2x}{}$ 

Slterms in H free from x ) dy = (-y-3) dy = -y2-3y

 $\therefore \text{CMdx} + \text{CHdy} = \text{C}.$ 

 $\frac{x^2 + 9xy + 2x - y^2 - 3y}{2} = C$ 

 $\frac{\chi^2 + (2y+2)\chi - (\frac{y^2 + 3y}{2})}{2} = C$ 

is the soln of given p.F.

Solve: 
$$(3x^2y + y) dx + (x^3 + \log x) dy = 0$$
.

He have,

 $M dx + N dy = 0$ .

He get,

 $N = (3x^2y + y)$ 
 $N = (x^3 + \log x)$ 
 $N$ 

34 x3 + 4 (lngx) = c

is the som of given D.E.

Solve:  $\frac{dy}{dx} + \frac{y\cos x}{\sin x} + \sin y + y = 0$ 3)  $(4\cos x + \sin y + 4) dx + (\sin x + x\cos y + x) dy = 0$ He bove, Mdx +Hdy =0 He get, M = 4 cosy +siny +4. N = Sinx + xcosy +x dM dy =  $\cos y + \cos y + 1$ (05x + (05y +1. dm = dH dy .. Egn is exact D.E.  $S M dx = S (y \cos x + \sin y + y) dx$ =  $y \sin x + \sin y x + y x$ S(terms in Mydy = S(No term) dy free from x) ean o add in ean a.  $y\sin x + \sin yx + yx = c$ .  $y\sin x + (\sin y + y)x = c$ . is the solp of given p.F.



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checonte

$$M = (1+e^{x/y})$$

$$N = e^{x/y}(1-x^{-1})$$

He have,
$$Mdx + Hdy = 0$$

$$He gel,$$

$$M = (1+e^{x/y})$$

$$N = e^{x/y}(1-x)$$

$$\frac{dM}{dy} = e^{x/y}\left(\frac{-x}{y^2}\right)$$

$$\frac{dN}{dl} = e^{\chi l y} \begin{pmatrix} -1 \\ y \end{pmatrix} + \begin{pmatrix} 1 - \chi \\ y \end{pmatrix} e^{\chi l y} \begin{pmatrix} \frac{1}{y} \end{pmatrix}$$

$$= -1 e^{\chi l y} + 1 e^{\chi l y} - \chi e^{\chi l y}$$

$$= -\chi e^{\chi l y}$$

$$= -\chi e^{\chi l y}$$

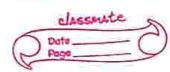
$$= -\chi e^{\chi l y}$$

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

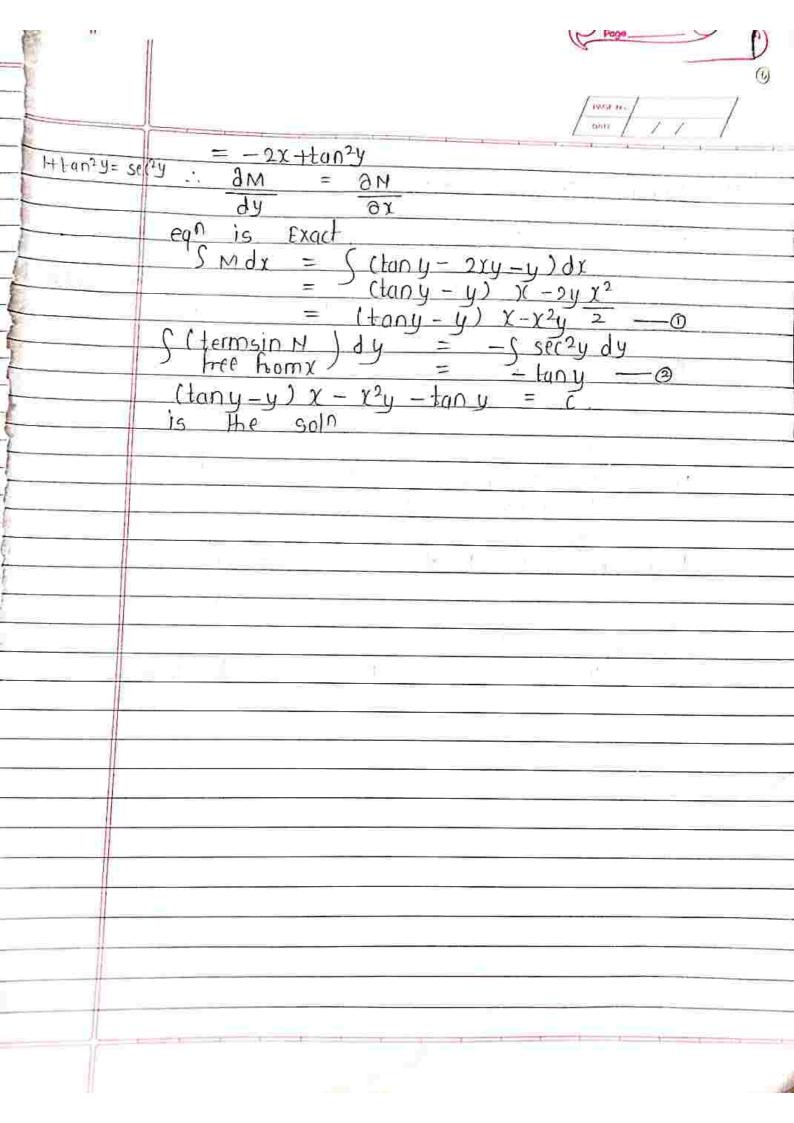
$$SMdx = S(1+e^{\chi y})dx = \chi + e^{\chi y} - 0$$

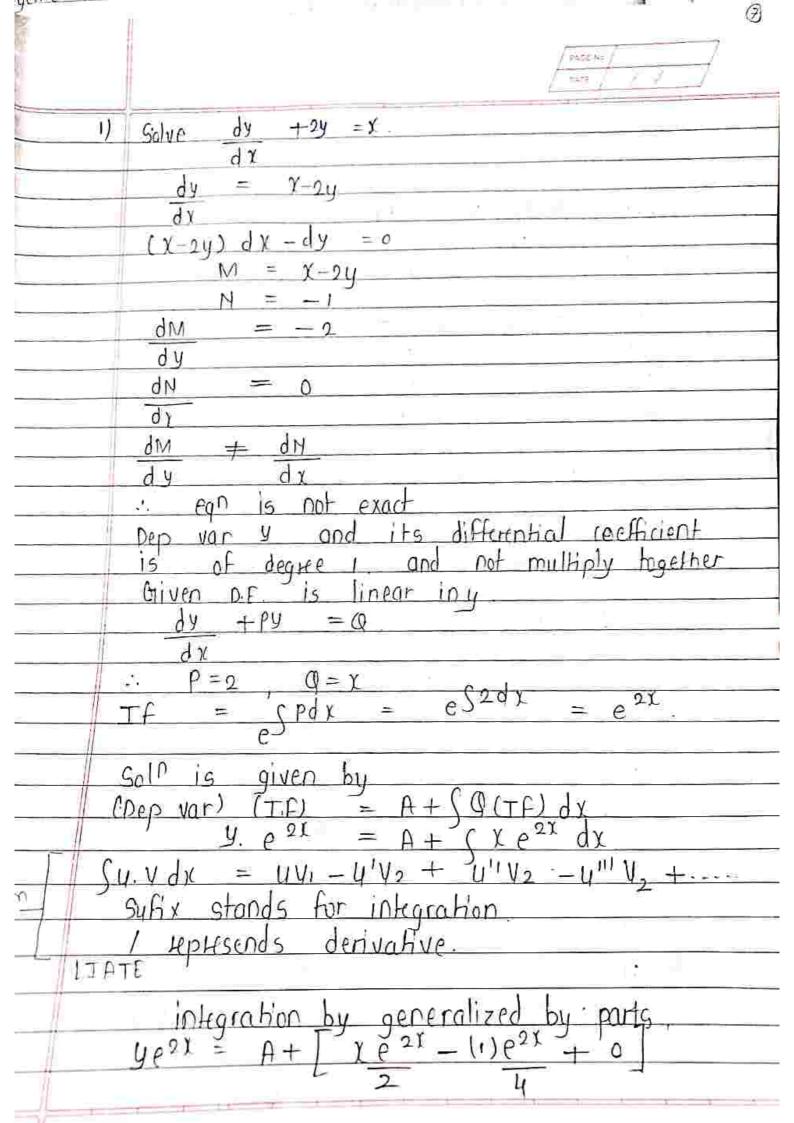
$$x + e^{xly}y = G$$
,

M<u>©</u>



Solve. (1,56x72+11x3) 9x+ (5x76x7,-37,) 9h =0 5) (niven ( y 2 x y 2 + 4 x 3 ) d x + 1 2 x y e x y 2 - 3 y 2) dy = 0 M dx + Hdy = 0  $M = y^2 e^{xy^2} + \mu x^3$ ,  $M = 2xy e^{xy^2} - 3y^2$  $\frac{dM}{dy} = \frac{y^2 e^{xy^2}}{2xy} (2xy) + e^{xy^2} (2xy)$   $\frac{dy}{dy} = \frac{y^2 e^{xy^2}}{2y} \left[ \frac{1+xy^2}{1+xy^2} \right] + e^{xy^2} (1)$   $\frac{dx}{dx} = \frac{2y}{2y} e^{xy^2} \left[ \frac{1+xy^2}{1+xy^2} \right]$ : aM = an eqn is Exact. ay bx  $= \left[ (y^2 e^{\chi y^2} + 4\chi^3) d\chi = y^2 e^{\chi y^2} + 4\chi^4 \right]$ SMdx  $= e^{xy^2} + x^4 - 0$  $\int \frac{\text{Lerminh}}{\text{free fronh}} dy = \int -3y^2 dy = -3y^3$ Solve: dy = tany - 2xy - y6)  $\chi^2 - \chi \tan^2 y + \sec^2 y$ (miven dy = tony - 2xy - y72-x tan2y +sec2y (tany-2xy-y)dx = (x2-x tan2y+sec2y)dy  $(tony -2xy -y) dx - (x^2 - x ton^2 y + 5ec^2y) dy = 0$ M dy + N dy = 0:.  $M = \frac{1}{4} \tan y - 2xy - y$   $N = -(x^2 - x \tan^2 y + \sec^2 y)$  $dM = sec^2y - 2x - 1$   $dN = -2x + tan^2y$ 04\_





$$ye^{2T} = A + e^{2T} \left( \frac{x - 1}{2} \right) \quad soln$$

2) Solve: 
$$y dx - x = 2y^3$$
.

 $y dx = 2y^3 + x$ 
 $dy$ 

$$y dx = 2y^3 + x$$

$$y dy$$
 $y dy - (2y^3 + x) dy = 0$ 
 $M = y$ 
 $M = -(2y^3 + x)$ 

$$\frac{dy}{dx} = \frac{dx}{dx}$$

$$\frac{\partial y}{\partial y} - \frac{1}{y} \chi = \frac{2y^3}{4}$$

$$\frac{\partial x - y = 2y^3}{\partial y - y}$$

$$\frac{\partial x - y = 2y^3}{\partial y - y}$$

$$\frac{dy}{dx} = 0$$

$$\frac{dx}{dy} = 0$$

$$dr + PI = Q$$

$$P = -1$$
  $Q = 2y^2$ 

$$P = -\frac{1}{y}$$

$$TF = e^{SPdy} = e^{-S\frac{1}{y}dy} = e^{-\frac{1}{99}y}$$

$$= e^{\frac{1}{99}y^{-1}} = y^{-1} = \frac{1}{y}$$

$$= e^{\frac{1}{99}y^{-1}} = y^{-1} = \frac{1}{y}$$

$$= e^{\log y^{-1}} = y^{-1} = 1$$

Soln 1s given by

(dep. vari ) (TF) = A + SQ (TF) dy

$$X \left(\frac{1}{y}\right) = A + S \cdot 2y^2 \left(\frac{1}{y}\right) dy$$

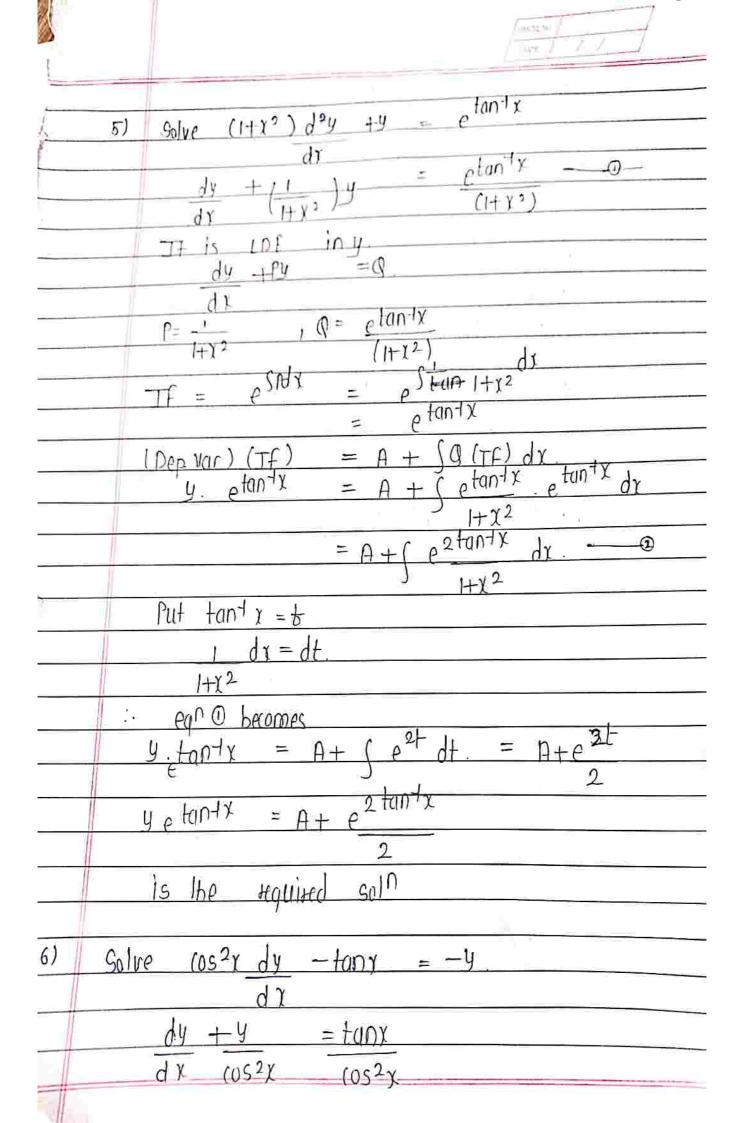
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(1)
               = A + 2y^{2}
X/y = A + y^{2}
is the solo.
                Solve x^2 \frac{dy}{dx} = 3x^2 - 2xy + 1.

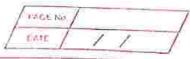
Given, x^2 \frac{dy}{dx} = 3x^2 - 2xy + 1

is linear p \in E in by
\frac{dy}{dx} = 3 - 2 \cdot y + 1 \qquad \oplus
    3)
                 \frac{dy}{dy} + \frac{py}{y} = Q
\frac{dy}{dx} + \frac{0}{x} = 3 + 1 = 0
\frac{dy}{dx} + \frac{0}{x} = 3 + 1
\frac{dy}{x} = \frac{3}{x^2}
\frac{dy}{dx} + \frac{0}{x} = 3 + 1
\frac{dy}{x^2} = \frac{3}{x^2}
\frac{dy}{dx} = \frac{3}{x^2}
\frac{dy}{dx} = \frac{3}{x^2}
\frac{dy}{dx} = \frac{3}{x^2}
             TF = e^{SPdx} = e^{S^2/xdx} = e^{2\log x}
= e^{\log x^2} = x^2
Soln is
              Soln is
(dep var)(TF) = A+SQ(TF) dx
= A+S(3x^2+1) dx
= A+3x^3+x
= 3
                  y\chi^2 = A + \chi^3 + \chi
         Solve ye^y dx = (y^3 + 2xe^y) dy
4)
            (miven, ye^y dx - (y3 + 2xe^y) dy = 0

M = ye^y , N = -(y3 + 2xe^y)
```

94 = A67+67 dy dMM = -204  $\frac{dN}{dy} \neq \frac{dN}{dx} = eq^n \text{ is not exact}$  $\frac{dx}{dy} = y3 + 2x e^{y}$   $\frac{dy}{dx} = \frac{y^{2} + 2x}{e^{y}}$   $\frac{dx}{dy} = \frac{y^{2} + 2x}{e^{y}}$   $\frac{dx - 2x}{y} = \frac{y^{2}}{e^{y}}$ \_\_\_\_ 7 is LDE in X  $\frac{dx}{dy} + Px = Q$   $\frac{dy}{y} = -2, \quad Q = \frac{y^2}{e^y}$   $TF = e^{\int -\frac{2}{y} dy}$   $= e^{\int -\frac{2}{y} dy}$   $= e^{-2\int \frac{y}{y} dy}$   $= e^{-2\int \frac{y}{y} dy}$   $= e^{-2\int \frac{y}{y} dy}$   $= e^{-2\int \frac{y}{y} dy}$ (Dep. var) IF = A+ (Q (TF) dy  $\frac{\chi(1)}{y^2} = A + \frac{y^2}{e^y} \cdot \frac{1}{y^2} \cdot \frac{dy}{y^2}$  $= A + S e^{-y} dy$  $= A + e^{-y} = A - e^{-y}$ is the soln





 $dy + (sec^2 x)y = tan x sec^2 x - 0$  $eq^{n}$  0 is L.D.f is y.  $P = sec^{2}x$  Q = tanx.  $sec^{2}x$   $Tf = e SPd x = e Ssec^{2}xdx = e tanx$ Solp is, (Dep Vai)  $(\text{Th}) = A + \int Q(\text{Th}) dx$   $y \in \text{tanx} = A + \int \text{tanx} \sec^2 x \cdot e^{\tan x} dx$   $\text{put } \tan x = t$   $\text{Sec}^2 x dx = dt$   $\therefore y \in \text{tanx} = A + \int t e^t dt$   $= A + \int t \cdot e^t -u \cdot e^t + e^t$   $= A + e^t \left[ t - 1 \right]$   $y \in \text{tanx} = A + e^t anx \left[ tanx - 1 \right]$ 

MATE /

is the required solo

ত্রী	Equation Reducible to linear Eqn. (Bernolli's egn)	
	Gernalli's egn ?	+
		-
	$dy + ry = Qy^n$ or $dy + px = Qx^n$ .	1
	d Y	
	where P. O OK fun of x where P. Q are him of y	
	or constant.	
		_
)	Golve $\frac{dy}{dx} + 2y = xy^3$	
	Given, $\frac{dy}{dy} + 2y = xy^3$ — ①	
	Given, dy +2y = xy3 -0	
	It is in Bernolli's form.	
	divide by 43	
#		
	43 dz 43	
	$y^{-3} dy + 2y^{-2} = x - \emptyset$	
	dχ	
ſ	$011+11^{-2}=7$	
	$-2 \cdot -3  dV = d $	
	AV AV	
	$1^{-3} d4 = -1 d2$	==-
	9 - 03 1	
	4 2 d)L 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	-1 dZ + 2Z = X	
	$\frac{\partial}{\partial x}$	
	d= -0x - 4	
	- Q L	

```
It is IDF in 2
                                                                       P = -4
= e^{-4} =
                                                      SolPis,

SolPis,
                                                                   \frac{y^2}{15} = \frac{1}{10} \frac{4x - 2}{10}
                                                          Solve dx - 2y = y^3 \chi^2
2)
                                                Given,
                                                       II is Bernolli form
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Put
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       X-1 = Z
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   -\chi^2 d\chi = dz
                                                                                                                                               becomes,
                                                                          dz + yz = -y3 ---
                                                       ean @ in LDF in Z
                                 TF = e^{3/47} = F^{3/2}

(Dep. var) (Tf) = A + \int Q (Tf) dy

Z = e^{9/42} = A + \int -y^{3} e^{9/2} dy
```

```
dz -2(tan) = -25ecx -- 3
    da
   It is LDE in Z
 P = -2\tan x, \quad Q = -25ecx
= e^{5rdx}
= e^{5rdx}
= e^{109(5ecx)^{-2}} = e^{-2\log 9(cx)}
                          Seco X
                                                                  -(2)
(Depvar) (IF) = A + SQ (IF) dx
                 = A + S - 2 \operatorname{Sec} x + dx
= A - 2 \operatorname{Scos} x dx
       SE(2x
                      A-2 TSINY ] as segn soln
Solve cose dr - rsine = -r^2
       de
Given DE is,
1050 dr - rsin0 = -12
   dÐ
   dr - (tane)r = -r^2 seco
   de
 It is in Bernoullis form
  \frac{1}{r^2} \frac{dr - r}{d\theta} = -\frac{sec\theta}{r^2}
ies r-2 dr - r tano = - seco -
         do-
put r^{-1} = Z
-r^{-2}dr = dZ \qquad r^{-2}dr
d\theta \qquad d\theta
   -dz - = tan A = - seco
```

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$$\frac{dz}{d\theta} + (\tan\theta)z = \sec\theta - 3$$

$$\frac{d\theta}{d\theta}$$

$$Th is LDT in Z$$

$$\frac{d\theta}{d\theta} + (\tan\theta)z = \sec\theta - 3$$

$$\frac{d\theta}{d\theta} + (\tan\theta)z = -2$$

$$\frac{d\theta}{d\theta} + (\cot\theta)z = -2$$

$$\frac{d\theta}{d\theta} + (\cot\theta)$$

ŧ

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PAGE NO.:
  \therefore e^{x} = A e^{-y} + e^{y}  is the solven eqn
          dy = e1-y (e1-e4)
Given, dy = e^{x-y} \left( e^x - e^y \right)

\begin{array}{rcl}
 & = & e^{2x-y} & (e^{x} - e^{y}) \\
 & = & e^{2x} e^{-y} - e^{x} \\
 & = & e^{2x} \cdot e^{-y} \\
\hline
 & & & & & & \\
\end{array}

dividing by e-y
eydy + eyex = e2x
                                                     -0
diff urta
 \frac{dx}{dz} + e^{x}z = e^{2x} - 0
               IS LDE in Z
                           Q = e^{2x}
= e^{x}
= e^{x}
     ex
                                                = A+Sex eex ex dx
                                                    A+St.etdt
A+ [tet-
  e^{x}dx = dt
                A + eex [ex-1]
```