-	
3	Linear differential equations
_	4 differential equation of the form
	dy + Py = 8
-	where, P and Q are constants or functions of n only,
	known as a first order linear differential equations
-	eme examples of the first order linear differential equation
-	
	$\frac{dy}{dn} + y = 8imn$, $\frac{dy}{dn} + \left(\frac{1}{n}\right)y = e^{in}$
-	$\frac{dy}{dn} + \left(\frac{y}{nlogn}\right) = \frac{1}{n}$
A	nother form of first order linear differential equation is
_	dn + Pin = Q1
W	
ep	mples of this type of differential equation are
	the in = cosu
	dy + n = cosy
	$dy + -2x = y^2 e^{-y}$
_	$\frac{dn}{dy} + \frac{-2n}{y} = y^2 e^{-y}$
7	Salve the first order linear differential equation of the type
_	dy + Py = & -0
_	an .
m	Hiply both sides of the equation by a function of n say gan to get
	g(m) 4 P. (g(m)) y = Q. g(m) -(5)
Cla	se g(n) in such a way that R. H.S becomes a derivative of y.g(n)
ie	g(w) dy + P. g(m) y = d [y. g(n)]
CY	
	g(m) dy + p. g(m) y = pm) dy + y g'(m) => P= g'(m)
ā,	g(n)

Indegra	uting both sides with respect to 11, we get
	$\int P dn = \int g' fm dn$
	J g(n)
	$\int P dn = \int g'(m) dm$ $\int P dn = leg(g(m))$
	The state of the s
	g(n) = espen
On mul	Hiplying the equation (1) by $g(n) = e^{\int p dn}$, the L.H.S the derivative of Some function of n and y . Thus $n = g(n) = e^{\int p dn}$ is called Integrating Factor Substituting we of $g(n)$ in equation (2), we get
becomes	the derivative of some function of in and y. This
functio	m g(m = e) phm is called Integrating Factor Substituting
the val	ue of g(n) in equation (2), we get
	Spota Spota
	E dy + Pe Span y = Q. e Span
	chi (ye Spoh) = Qe Spoh
Titer	afing both Sides with respect to m, we get
-	
	y. e Span = S (Q.e span) of
	y = e - f (a.e spt.) in +c
67	J- e . J (die) di +c
. shiels	is general Solution of the differential equation.
Willer	general equation.
-	

+ Steps	Involved 60 Solve first order linear differential equations
(i) Write &	be given I: Clemital auton
where D.	he given differential equation in the form dy + Py = 0
	constants or functions of make an
مادران (ازازا	he Integrating Factor (I.F) = e John .
an pond	the Solution of the given differential equation as
10	
T- C080	for G (I.F) = S (QX I.F) dn+C
JA CHIC	the first order differential equation is in the form
C.I.A.	ections of y only. Then I.F = e' ond the
Stuttion	of the differential equation is given by
	n. (I.F) = [(Q1 x I.F) dy +C
Exi Find 7	the general · Salution of D.E on dy + ay = no (n + 6).
Solution	dy.
	$n \frac{dy}{dy} + 2y = n^2, -0$
Step 1:	
Dividing bot	h sides of equation (1) by m, we get
	dy + dy = n
	anc red
which is t	linear diff eg of the type dy + Py = Q, where P= 1, 8 Q=n
Steps: So, .	Carl de
T.	== e = e = e = n2 [as e o da = f(n)]
Therefore, S	thetican of the given equation is given by y(z.f) = [a(z.f)dn to
Steps: Solution	n gran og g (3.5) = J & (3.5) an te
	y.n2 = S(n)(n2) dn + C = In3ch +c
_	11 - 2 - 1 - 1
	$y = \frac{n^2}{u} + Cn^2$
which .	the general Solution of the given differential equation
1.3	Several Calliffor of the Alan III II

Lecter	ne #03 Unear D.E	_
=) D./	E 18 Said to be linear if it satisfies the following condi	(teles
1. Dej	pendent variable and it's derivative (5) seem first degice form in the equation that Contains the product of dependent	
Ya	stable and its derivative (s).	_
3. No	transcedental function with dependent variable.	-
		-
	$\frac{dy}{dn} + P(n)y = Q(n)$	_
		-
Ex:	(1 +m2) dy + zray = 4m2	-
	dh	_
Solution	$\frac{dy}{dn} + \frac{\partial n}{\partial n} y = \frac{1}{n^2} + \frac{\partial p(n)}{\partial n} = \frac{\partial n}{\partial n} + \frac{\partial (n)}{\partial n^2} = \frac{2}{n^2}$	_
	the 1the 1the 1the	_
	I. F & Spinion = & Sin dn Inthi) = [1+n2]	-
(E)	I.F e = e = 1+n2	_
		2
3 Sul	ution y.(I.F) = \(O (IOF) dn +C	_
		_
	y (1+n2) = 1 4n2 (1+n2) on +c	_
	14112	1
	y (1+n2) = 4/n2 dn +c	1
	y (1+n2) = 4 x3 + C Pms	
A SAME OF THE PARTY OF THE PART		
April de la constante de la co		
فاستباعث أعلهبان		-
110		
1 1/4		-

	11120 - 10
Ser	naulli's Differential Equation
_ d	y + p(m)y = a(m)ym
100	
f_	m=0,1 then B.E is Unea, If no 1 then Bernoull
1	- Con
1018	y dy + p(n)y - a(n)
	U dk
le	$\frac{1}{y^{1-n}} = z \implies dz = (a-n)y^{-n} dy$ $\frac{1}{y^{1-n}} = \frac{1}{y^{1-n}} dy$
	dn dn
_	=> 1
7	1-n dr dn
_	$\Delta dz + p(m)z = Q(m)$
-	1-n dn
_	
-	dx + (1-n) p(n) x = (2-n)Q(n) = Linear D.E
dy	+ y = y>
JE.	dy)+ + + + + = 1 => 4-, qn + + 1-1=1
0	CAN NO
- 7	= y-1, dx = -1 y-dy => - dx = y-1 dy
	an an an
	$\frac{dz}{dx} + \frac{1}{2}z = 1 \Rightarrow \frac{dz}{dx} - \frac{1}{2}z = 1, p(m) = -1, q = -1$
	m n dn n n = -1 d= -
=>	6. 2 = 6 - m(m) = M(m.) = M
mi	
	$\frac{2}{2\pi} = \int (-y) dx + C \Rightarrow \frac{2}{2\pi} = -\ln(x) + C$
0.	place : y + h (n) = c => 1 + h (n) = c
KY	TWIMI ST

Worksheet #03 Linear & Bernoulli Check assert Conditions: Degree, Aroduct, From eccedondel (DPT) Salution D.E in the form ttu + (n) y = (n3-3), pen = 1, alm = n3-3 Integrating Factor = I.F = Jpm in Step2: = n T.F = Q (I.F) on +C write Solution => y(I.F) = step3: (m3-3) (m) du +c In4 dn - 3/ m2 dn +c

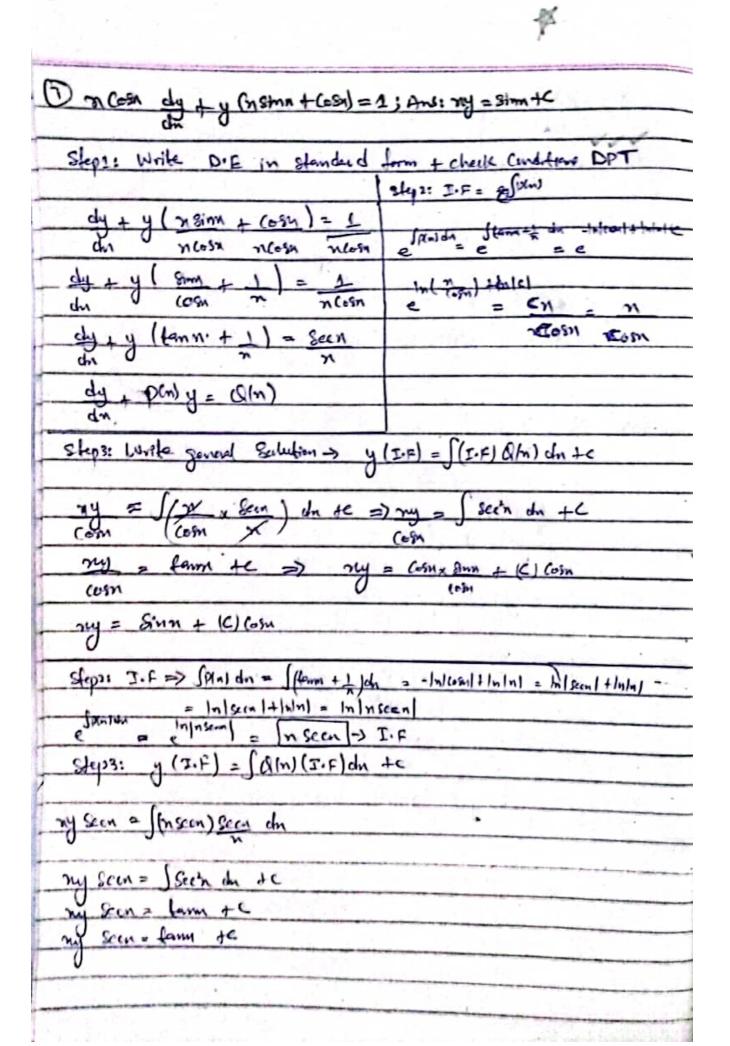
2. (2y-3n) dn + n dy =0 Ans: yn2= n3+c
	. Write down D.E in dy + pan) y = a(m) form
let	y= u.n, then dy = n du + u
	Carral da
	(2y-3n) dn = -n dy
	3n - dy - dy , Act yo u.n., and its deriveding
7	$\frac{3N-3(u\cdot N)}{N}=\frac{N}{ch}\frac{dy}{dy}+\frac{M}{dy}$
	3- Du = n du +u, multiply of on both sides
	$\frac{du + (3u)_1 = 3}{du} = 3$ $\frac{3p(n)}{3u} = 3$
	$\frac{du + (3u)_{1} = 3}{dn} = 3 \implies \frac{du + 3 \cdot u = 3}{dn}$
Step1:	Integrating factor => I.F = elphiloh
و	$\int P(n) dn = 2 \int n dn = 3 \int n dn = 2 \int n^3$
	The state of the s
Step31	write down Solution y (I.F) = Ja (I.F) dn te
	1 (10) - Jan 46
	4 (n3) = J(3) (n3) dn + C, where is y
	(m) contact the m
	$n^3y = 3 \int n^2 dn + C$
The	X
	n2y = 3n3 +e -> n2y = n3 +c, or
	3 10 40,00
	y= m + cm-2
	IVIC M L // M

3)	dy + y cotn = cosn Ams: y sinn = sin'n +c
-	lution DPT: Degree, Product, From excelontal
8	teps: Write D.Ein the Standar form dy + PMy = QW
	dy + y codn = (os(n), p(n) = (ot(n), Q(n) = (os(n)
81	ep2: Integrating factor => I-F = el.pm) dn
_	espension footnom = Internent = Sin(n)
S	tep3: Selution y (I.F) = IQ (I.F) dn +C
	y sinfn) 2 Scosin) sin(n) on +c , let ue sin(n) -then du = Cosin) dn
_	y stnln1= Sudu+C
_	$y \sin(n) = u^2 + c \Rightarrow y \sin(n) = \sin^2(n) + c$
4	dy + y secont = famon) y = c-n +1 secont ffamon
	ep 1: dy + y Secon) = fanon), pm) = secon, Q(n) = fanon)
st	p2: Integrating factor: e , let u= seinstaning, duz seinforn +te
ev	Sec(n) (Secon Hann) ch = e Sec(n) + Secon Hann) de f du holul - secon Hann) e = e = c
	1= Sec(m) + fombn1 = IoF
Ste	03: Salution: y (Secontamn) = f famon) (Secontfamon) don te

```
y (secon) + form(n)
                                famin) (secon) + famin)) of +C
      y (see(m) + tem(m))
                                 (Sec(n) fem(n) + fem (m)) In +C
       y (secon) + form (n)
                                   Secon) for Colon+ (fanica) do de
       y (seen + ten n
                                            S(Section - 1) du +c
                                   Sec n
       y (seen + famn)
                                  Seen
                                         + fann +82
                  Seen. + famin)
                                     C- M
                    Secont tonon
                                   faminitscem)
                                                       See(n)+tonn
                                      Ans: 42 fann -1
Saletion
           DPT
 Step 1: Write
                       D.E in standard
                 the
                                                    dy + pm)y = am
                                 phol
                                       tan in 17 Oin
                                        Cosimi
                                         e Spins of
Steps: Integrating factor = I.F =
   Splan da
                           I sein dn
                                          (an(n)
                                                = I.F
                       y (I.F) =
                                   Q (I.F) on +c
Slep 3:
       Solution
                                 dn +c
                                     efanin) dn +C
                       fanin) Sectin)
```

let u= fann, du= Sectuda	Tabular Integration -> Sue"du
only for right side of.	desirates of U Judgistions of E
So,	u + e"
Stank Secare familial of to	Setin - e4
	Thegration to this problem becan
Judu (e4) +C	Integration to this problem becan
	the u is a informetric ferm. So
Jue du +c	we need to apply the Integration
	by pasts
Tabular Integration X Integration by parts	yetamin) = Stammsee'n etaminida
Integration by parts	he = 1 temasigue de qui
Sudv = uv- Iv du	grate yetann = tanin)e tann tann +c
Tale	grate
U= form(m) Sector etanto de sector etanto	J y = tembrile farm - efamin + C
u= form(m) dv= sector eternion	dn cham cham cham
du= Sectar da N= etam	
Aller integration W.	y = fam(n) - 1 + ce fami
= (lann) (etann) - Jetan seeindn	
= Hemmi) (e) -je see nam	
= lan (m) e tan(m) - e tann	
A STATE OF THE STA	

	a) dy - 3y = (n+a)5 Ans: 2y = (n+a)5+ ac=(n+a)3
sleps: W	ife the D.E in Standard form (Assect, check Conditions DPT)
12	te) dy - 3y = (n+e)5, 1 on b)3
	$\frac{dy}{dx} - \left(\frac{3}{3}\right)y = (n+e)^{\frac{1}{3}}$
dy.	
7	
Step 2:	
S.Danie	$I \cdot F = (n+a)^{-3}$ Solution
steb:	y.(I.F) = S(I.F) Q(n) dn +C
	y (n+e)-3 = \(\left(n+e \right)^3 \left(n+e \right)^4 \) dn +C
-	y (n+9)= (n+2)+ c
	$y = (n+e)^2 + (n+e)^{-3}$
	y = (n+e) = 4 (n+e) = 3
	2y = (n+9)5 + 2 C (n28)-3
	성이 보다는 아이지 않는데 가는 것이 되었다. 그 그리고 있는데 그 아이지 않는데 나를 했다.



1 Seen dy = y + 8thm Ans: y= -8tm -1+
steps: dy - y = 8in => dy - (1) y = 8inn on seen seen dn (seen) y = 8inn
Stops: franch - fcosn dn grun e = e = e
Steps: y (I.F) = J (I.F) Qm) dn +C ye sim Sinn dn +C => ye sim sinn Cosn dn +C Seen
=> let u= sinn, du= cosn dy => yesim = fe u du +c.
=> ye-sim = Jue-4 du+c => Indegration by parts Judy=UN-Judy
=> yeshu = Jeshu cosu du +c Jeshu cosu du, du= com (ct u= 8inn, dv= e-sinn cusu du + Je4 du = -e4 -sinn
$du = (osn, N = -e^{-sim})$ $y = -sinn = \int e^{-sinn} cosn sinn dn + c$
y = sinn = (sinn) (-e-sinn) + [-sinn &bon dn
ye-shin = - = shin 81mm + (-e-shin) +c
$y = -\sin n - 1 + c$

D (۱ + ۶۰) و	n = (Jeni	!n) du		Ams: 71	= - tan'y -1	+celanty
Sfem :	Write	the Diff	In Slave	and form	n and	Cheek com	diftans
	du (las)	1-11 - y2	1 80	Now?			
14	de	. 0	= 1		. Ve. 1 .	POL P	
let	us chan	ge the mo	lependent	variable			
((1 ty2)	dn = lt	an'u -nl	dy ,	1	m b/s	5
A Control	0		J	0	નુષ		
((1 ty2)	dn = (lany -n) 45	(1+	ditide a	16/5
		dy	0	25			
((1842)	du = 1	lanily -n	da	+ D(a) N	= Q(u)	
	(1+42)	~	1+42	dy	+ p(y) n	. 0	
d	m =	lany -	N. =	dn	- M	= tenty)
C	ly	1442	1+42	طا	1+12.	.1442	
Sleps:	Integr	alting fact	er				
		7.2		C/	i I	1.1.1	
J ply)) dy = 5	1 dy 1+42 9	= teni	i; e	2	elary	
						- Y	1
Step3:	Crener	al Subulio	an				V. Sala
)(electroly	(I.F) = U	(TCy) (I-F) dy +	100	y,
ne	2 Jeans	1(elevis)dy	te				
	11492	1 0	-	xtenily =	uv - [vdu te	
Ne tan	= Stany	x e +	e in	Jany =	(tany) et	my - (fam'y	40
		1+92		U	. Haris	14/2	-
let us	lary, de		right	taniy =	lan'y etan	y - elarly	te
du =	1492	1493			0		
n dan'y	= Judu	+c		1 e tanty	= taniye	tany - elan	y te +
n fanily	2 uv -J	rdu te		n= la	my - 1	+ C	
		-			0	+ C etary	
	(lenty) v -			n = ta	-1 y = 1	+ Ce tanily	
Jdve J	e (, 1	et a= fant, de	R= Itax		0		
= Jeda	(=) Y	2 6 3 VE	(وانسط	5.71			
10.00					-		

(10) d8 + (2x cito + 81n	(20) do = 0; Ami: rsinte sinte je
steps: Write the Diff in	Linear D.E Standard form and
/ check the Condition	
dr = - (dr cato + sindo)	Sleps: J.F
do	Sp(a) da = Sa coto do = a Sesa do = a(-Insesol)
dr + ar coto = - Sinao	
do	= dm/succ m/susci Strice = 1 = Secto.
dr + p(0)r = 0(0)	Sosta
do	Jir = sec'll
p(0) = 2 coto, 0(0)= - sin20	
Steps: Cremeral Solution Y	(I.F) = JQ(0) I.Fd0+C
	Step 2: I.F
x Sector = - (sinap sector do +c	Sp(0) da = afcota da = a f cosa da
	Sino
Y seco = a frino coso seco do te	= (2) n 8/n 0 = n 8/n 2
where sinze = 28100 Casa	
	e = e Sin'a = J.E
TECTO = - as since coso do te	Step 3: Crevered Solution
C08-0	Y (I.F) = [Q(0) (IF) del +C
rseco = -a Since do te	y (sinta) = f-sinau sinta de 10
U coso	sinda = 2 sina losa
rsec20 = (-a) (-In/coso1) +e	rsin'a = -a sina cosa sin'a da ta
	75/1-10 = -2 (stn30 cosco de +c
	let ue sind, due loss
	r sin'ce = -a f u3du +c
Y.	y sin'a = -241 +c
	85in= Q = -41 +C
	λ ,
	r sin20 = - Sinta + c
	a

D wydy +y(y+n) du	ny m²
	in Linear D.E standard form and
assert the C	orditions.
m2 dy = - y(y m)	$\frac{dy}{dy} + \frac{y}{2} = -\frac{y^2}{n^2} + \frac{1}{y^2} \text{ on 6/3}$
dK.	
$\frac{dy}{dt} = -\frac{y}{n} \left(\frac{y}{y} dn \right)$	1 dy + 1 = -1 (let z=1 , de = -1 d
	he ou man we are de
dy = -y2 - y	-de + = -1
	on n n
dy + b = - 42	$\frac{dz}{dn} - \frac{z}{n^2} = \frac{1}{2} \Rightarrow \frac{dz}{dn} + p(n)z = p(n)$
ch n n2	de no no de
Bernoulli	
Sleps: I.F. p(m)= -1	Q(n) = 1
1 (A)	7n²
(0/m) de = () d =	Lili I I al s Sp. Inta'l
Sphi) di = S-1 di = -	m/n/= m/n'/ -> e = e = [1 = I.E]
	M(n) = m(n) -> e = e = [1 = I.E]
Step 3: Croneral Salution	S(EE) = D(O(n) IE du to
	S(EE) = DOW) I'E qu to
Step 3: Croneral Salution = Step 1 dn + c	$\frac{2}{2}(z\cdot z) = \int Q(n) z\cdot z dn + c$
Step 3: Croneral Salution = Step 1 chr +c = Step 1 chr +c	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution = Six in the te	$\frac{2}{2}(z\cdot z) = \int Q(n) z\cdot z dn + c$
Step 3: Croneral Salution = Six den to = Six den to	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution $\frac{7}{7} = \int \frac{1}{n^2} x dn + c$ $\frac{7}{7} = \int \frac{1}{n^3} dn + c$ $\frac{7}{7} = \frac{7}{7} + \frac{1}{7} + c$ $\frac{7}{7} = \frac{7}{7} + \frac{1}{7} + c$	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution = Six den to = Six den to	$Z(z,t) = \int Q(n) z t dn t dn dn$ $Z(z,t) = \int Q(n) z t dn dn dn$
Step 3: Croneral Salution $ \frac{7}{7} = \int \frac{1}{n^2} x dn + C $ $ \frac{7}{7} = \int \frac{1}{n^3} dn + C $ $ \frac{7}{7} = \frac{1}{n^3} + C $ $ \frac{7}{7} = \frac{1}{n^3} + C $ $ \frac{7}{7} = \frac{1}{n^3} + C $	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution $Z = \int \frac{1}{n^2} x \int \frac{1}{n} dx + C$ $Z = \int \frac{1}{n^3} dx + C$ $Z = \frac{1}{n^3} + C$	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution $ \frac{2}{3} = \int \frac{1}{n^2} x \frac{1}{n} dn + C $ $ \frac{2}{3} = \int \frac{1}{n^3} dn + C $ $ \frac{2}{3} = \frac{1}{n^3} + C $ $ \frac{2}{3} = \frac{1}{n^3} + C $ $ \frac{2}{3} = \frac{1}{n^3} + C $	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution $Z = \int \frac{1}{n^2} x \int \frac{1}{n} dx + C$ $Z = \int \frac{1}{n^3} dx + C$ $Z = \frac{1}{n^3} + C$	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$
Step 3: Croneral Salution $Z = \int \frac{1}{n^2} x \int \frac{1}{n} dx + C$ $Z = \int \frac{1}{n^3} dx + C$ $Z = \frac{1}{n^3} + C$	$Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$ $Z(z,t) = \int Q(n) z_{1} dn dc$

(D) du 1 1 1 1 2 714	yer Ans: nhy = ner -er+c
steps: while the DIE in	the Standar Linear D.E + check Condition
n dy + ylny = nyen	$\frac{dx}{dx} + \frac{x}{x} = e_{x}$
dy + ymy = yen	step2: I.F pCn)= Ln, Qln1= en
dn n	$\int P(n) dn = \int \perp dn = n n $
y on my = en	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
$\frac{\text{let } z = \text{lmy}, dz = 1 dy}{\text{dn}} \text{ if } dn$	
Step31 Creneral Sulution	2 (I.F) = JQ/n) I.Fdn tc
z(n)= Inen dn +C	zn = nen_entc , z= hy
zn = Judv +c	nly = nen -entc
Tabular Integration	
ਰੂ (ਅ) Jdv	
1 Den	
o sup sen	
ne" - en = Inendn	
xn = Ine dn +c	
The = Mex-en tc	

dr 1th	ecy Ams: 8imy = ente
Step 1: Lunke D. 5 in Stand	and Unear D.E and Check Condificant
dy - formy = (14n)erszcy	let z = siny, dz = cosy dy
Sey on Isn	$\frac{dz}{dn} = \frac{z}{1+n} = (1+n)e^{n}$
(- Sy chy - Stry x (- Sy = (12m) ex	Step2: J.F. Sp(n) = - Stim = - In / 1 +n
Cosy dy - Siny - (1+n)en	= n 1 du = n 1 du -1 = 1/1 du
Steps: General Salution 2	
Z = Slitule" dn te	
1th 1th	
$z = \int e^{n} dn + c$	
$z = \int e^{n} dn + c$	
$Z = \int e^{n} dn + C$ $Z = e^{n} + C$	
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$Z = \int e^{n} dn + C$ $Z = e^{n} + C$ $Sim = e^{n} + C$	
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$Z = \int e^{n} dn + C$ $Z = e^{n} + C$ $Sim = e^{n} + C$	

(14) lany dy + lann = Cosy Co	sin Ang: Secy = (Sim re)
Steps: dy + tam = cosy costn	fany dy + tam = cosy cosh
T 0	
dy + famm = cosycosin x cosy	Sity du town = Cosycosty
an tam	
dy fam = Cosy cos2n	let z= cosy, dz = -siny dy
an tany siny	
	-1 dz + fam = z (05)n
Step 1: tany dy , tam = cosycosa	a Da James
	Step2: I.F => eJPindin
Siny dy + fann = Cosy cos2n	Spin) dn = Storm dn = miserni
(exi cm	Spendy Internal = [Secn = J.K
let z = 1 , dz = secy lamy dy	Step3: Creneral Solution
	A(2.E) = [B(u)(2.E) qu te
de - tany dy	ysen = 1 seen cosin do to
	yscon = I cos'n dn te
Siny dy + tam = cosycos'n	(0541
Siny du 1 fann = 65%	yseen = 1 Cosm du +c
(est on (est	0 0
Con	year = Sinn +c
(osy dn (osy	> zsene Sim to
100	while == 1
dx + = (053)	Copy
dn + 2 frim	Secry e Strin +C
	CoSy
P(n)=fann; (8(n)= (05x	
14.1/- Hally ; (X(m) = Zoon	sear Secy = (Sim +c) any
	sacy = (ston +c)
	Cosn
	Secy = (sin n +c) cosn

(18) m [dy +y]=1-y	Ans: y = 1 + C e-h
Steps: 7 dy + my = 1-y	Slep2: I.F
911	(production = ((1+1)dn = n+holm)
dy + y = 1-y 2/200	110
	e = e = e.e = xe
- # +y = - # - #	Step 3: Solution
	yne" = Ine" of to
dy +y + y = 1	
	nyen = Sen tc
- 9/1 + A(1+x)=x	· nyen = en +c
P(n)=1+1, Q(n)=1	y = en ; c
N N N	
A STATE OF THE STA	y=1+cex
1 y hay dn + (n - hay) dy =	=0 Aut mbu = 1 hoult
0.0	=0 Ansi nhy = Uny/+1c
	2
Steps: Working D.E in St	
steps: worthy D.E in st	
steps: worthy D.E in st	femoloud form
4 m b/3 y/my c/m + (n-my) dy =0	fundad form $\frac{dn}{dn} + \frac{n}{2} = \frac{1}{2} \sqrt{\frac{n}{2}}$
Steps: Worthy D.E in so dy yhny dn + (n-hy) dy =0 on dy	formal du $+ 1 = 1$
4 m b/3 y/my dm + (n-my) dy =0	fundad form $\frac{dn}{dn} + \frac{n}{2} = \frac{1}{2} \sqrt{\frac{n}{2}}$
y by dy + (n-by) dy =0	fondaud form $ \frac{dn}{dy} + \frac{y}{y} = \frac{1}{y} $ $ \frac{dy}{dy} + \frac{y}{y} = \frac{1}{y} $ $ \frac{dy}{dy} + \frac{y}{y} = \frac{1}{y} $
y my dn + (n-my) dy =0 y my dn + (n-my) =0 y my dn + (n-my) =0	fondard form dn + 1 = 12/ dy yhry yhry dn + 22 = 1 dy yhry Step2: Integrating Factor
y by dy + (n-by) dy =0 y by dy oh dy y by dy - (n-by) =0	formational form An + M = Ind Ay yhuy yhny An + D = I Ay yhny Step2: Integrating Factor Splip dy = I dy, let us how due I
ylany dan + (n-lany) dy =0 ylany dan + (n-lany) =0 ylany dan + (n-lany) =0 ylany dan + (n-lany) =0 n is dependent was here or D.C will look like	formational form An + M = Ind Ay yhuy myling An + D = I Ay Yhuy yhuy Step2: Integrating Factor Spling dy = I dy, let us ling, duz J d yhuy C.
y by ch + (n-by) dy =0 y by ch + (n-by) dy =0 y by ch dy y by ch t (n-by) =0 n is dependent var here	formational form An + M = Ind Ay yhuy yhny An + D = I Ay yhny Step2: Integrating Factor Splip dy = I dy, let us how due I
ylany dan + (n-lany) dy =0 ylany dan + (n-lany) =0 ylany dan + (n-lany) =0 ylany dan + (n-lany) =0 n is dependent was here or D.C will look like	fondaud form $ \frac{dn}{dy} + \frac{m}{y} = \frac{1}{y} $ $ \frac{dy}{dy} + \frac{m}{y} = \frac{1}{y} $ $ \frac{dy}{dy} + \frac{m}{y} $ $ \frac{dy}{dy} + \frac{m}{y} $ $ \frac{dy}{dy} + \frac{dy}{y} $ $ \frac{dy}{dy} = \frac{1}{y} $ $ \frac{dy}{dy} + \frac{dy}{dy} $ $ \frac{dy}{dy} = \frac{1}{y} $ $ \frac{dy}{dy} $ $ \frac{dy}{dy} = \frac{1}{y} $ $ \frac{dy}{dy} = \frac{1}{y} $ $ \frac$
y by dy + (n-by) dy =0 y by dy on dy y by thy =0 n is dependent var here s Die will look like dy dy dy dy dy dy dy dy dy	formational form \[\frac{dn}{dn} \pm \frac{m}{m} = \frac{m}{m} \] \[\frac{dn}{dn} \pm \frac{m}{m} = \frac{m}{m} \frac{dn}{dn} \pm \frac{m}{m} \] \[\frac{dn}{dn} \pm \frac{m}{m} \pm \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \frac{dn}{dn} \pm \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \frac{dn}{dn} \pm \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \frac{m}{m} \frac{dn}{dn} = \frac{m}{m} \fr
y by dy + (n-by) dy =0 y by dy on dy y by thy =0 n is dependent var here s Die will look like dy dy dy dy dy dy dy dy dy	formational form An + M = Ind Ay yhuy myling An + D = I Ay Yhuy yhuy Step2: Integrating Factor Spling dy = I dy, let us ling, duz J d yhuy C.

Step 3: General Solution M(2	[.F) =) Q(y)(J.F)dy +c
a my = 1 4 x my dy +c =	> n by = f by dy te, u=by, du= j
nhy = [udu => nhy =	42 10 => July = (Jul) 2 10
(1) (1+y2) du = (tomy -)	n) dy Ans: n=(tanty-1)+ce-tan
Steps: (1+y2) dn = (+anty-n)	Step 2: I.F) trigonometric Substit
all de	Splydy = S 1 dy = terry
do = tanij-n	
dy (14y2)	
du = famy - n	Step 3: Crement Solution
dy 1+42 1+42	netariy = Jany x etary dyte
du + n = tany	netary - Stany etary dyte
dy 1+92 1+92	netany = (etany x tany dy
dn + p(y)n = Q(y)	ne 0 = et x tem dy
4	netariy = uv - Judy +c
Integration By Parts	meterny = temy eterny - [eterny dy to
Judu= UN Judu (ILATE)	1+42
d= +my, 0= = 13/1+91/0	ne = tanyetany - etany +
1+y2 1/2 = etan	
(dv = (e tanily du le tanily	n = tany etary - etary + c
1+42 du= 1/1+42 dy	etenty etenty dang
Sav = Cell dy	
vze4 = etan'y	$n = \tan y - 1 + C$
	etan'y
	-tom/y
	n = tan'y -1+ cetany

40 .	Andi 8 = Sina+(c)(osca	
Steps: Write DIB in St	anulard Lineari D.E	
$- \frac{dv_{660+} + sin 0}{d0} = r^2, -\frac{y_{6060}}{on b/s}$	(050) de = + [smade= -1/1 (cosa)	
do on bis	(080)	
dr - 78ma = -72; 1 a	Ws = 1/0/da = -1/0/050 = 5000	
90 Coro Coro 3,		, -
1 dr - since = -2	Step3: General Solution	_
es qo reoso coso	Z(I.F) = \((0) I.F date	_
$z = \frac{1}{2}$, $dz = -1$ dx	ZSeco = 1 1 x Seco do te	-
		1
de + 2810 - +1	Z (080 = +) \$000+C	-
90 (20 (20)	Z Seeco = + Cancer+C	-
Z Sud = fand +C, z=/4	Z Sell = family +C	,
		-
Seco = 8 => 1 x	Sind . c	-
Sold = 8 => 1 x	SING TC	
02-0	SING 4C	4
land to Coso	SING +C	
1 x 1 =)	STMG +C COSG : = Y:	
1 x 1 =)	STMG +C COSG : = Y:	
1 x 1 =)	STMG +C COSG : = Y:	
1 x 1 =)	STMG +C COSG : = Y:	
1 x 1 =)	STMG +C COSG : = Y:	
1 x 1 =)	STMG +C COSG : = Y:	

1	18) Cosn dy + Ly 8mm = 4 / Secn Ans: Free mad Chann +
1	Steps: Write the D.E in Standard Union Form
+	Con I Was With con
+	Cosn dy + 4y Sm = 4 Ty Sen; 1 on b/9
+	W.S.
+	dy + 4y 81m = 4vy secn 1 1 m b/s
+	
-	1 th the Lam = 45 seen ; 1 seen
+	vy vy com com
+	1 dy + 4vy tam = 4 sen ; let zevy ; dx = 1 dy
+	
+	adx + 4x fam = 4 secon p(m) = atam, O(m) = a secon
1	dr dz 1 axlam = 2 sein
1	Stepz: Integrating Factor dn
1	Sorn du = & fram du = - Am (cosn)
1	- similaria interest
	= = = = seen -> I.F
	Step3: Cremeral Solution
	Z(I,F)= (Q(x) I.F. dn +C
	z seen = Jasein sein dn +c .
8	ZSe2n = 2tamn + 2 43+C
	Z Sein = 2 Sein Sein du te 3.
T	z seen = atomn + 2 town + e
	Z Sein = a Sein (1+ fanta) dutc 3
	z = See'n = a Sseety +2 seety fam +C Ty See'n = alam + a tan'n +c
1	z = Seeth = a Seeth + 2 Seeth short Ty Seeth = alfam + 2 tomin + c
C	7- Alam + 9 (ct love do +c 1/1 602 - 2 [10 1 13.7]
20	x = 2 temm + 2 Set temin on + c Ty sez n = 2 [tem + tens n] +e
	= fam, du= sect du
-	2 -1 -1 -1
	ein = aform + a u du +c
	Sein = alom + a Li3 +C

