Differential Equations

UNIT- V

Ву

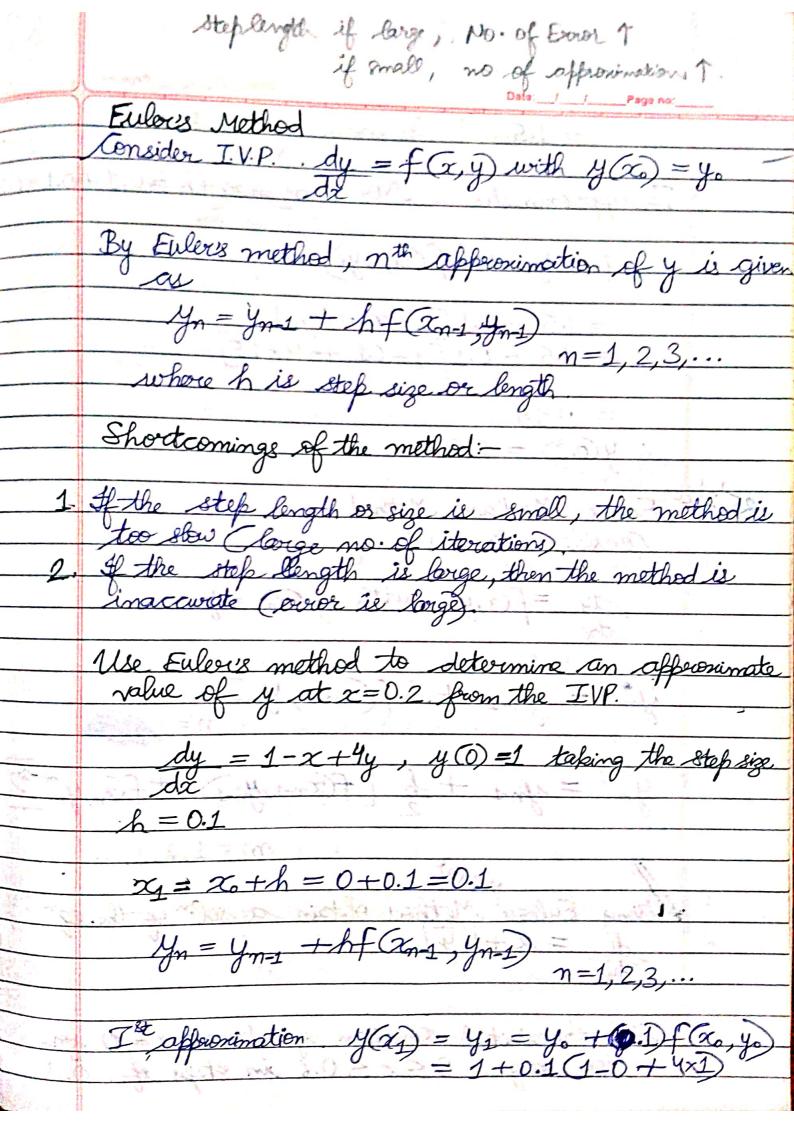
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22 2 29 Numerical Edutions of O.D.E. Initial blue Publem (IVP) - If all the condition that are suggisted to salve on D.E. are given at a single foint, then the footslem is said to be IVP. Example: dy = f(x,y) with y(x) = yo y" = f(x, y, y; y") with y(1) = 0 y(1) = 1 y"(1) = 4 y'' = f(x, y, y') with y(0) = 1y'(0) = 2Boundary Vilva Broblem (B.V.P.) -> If all the imposed conditions that one required to solve prival differential eq. are given at more than one fairly, then the poblem is called By. Example - y" = -f(x, y, y', y") y 6) =1 y'(1)=2 y''(2)=3

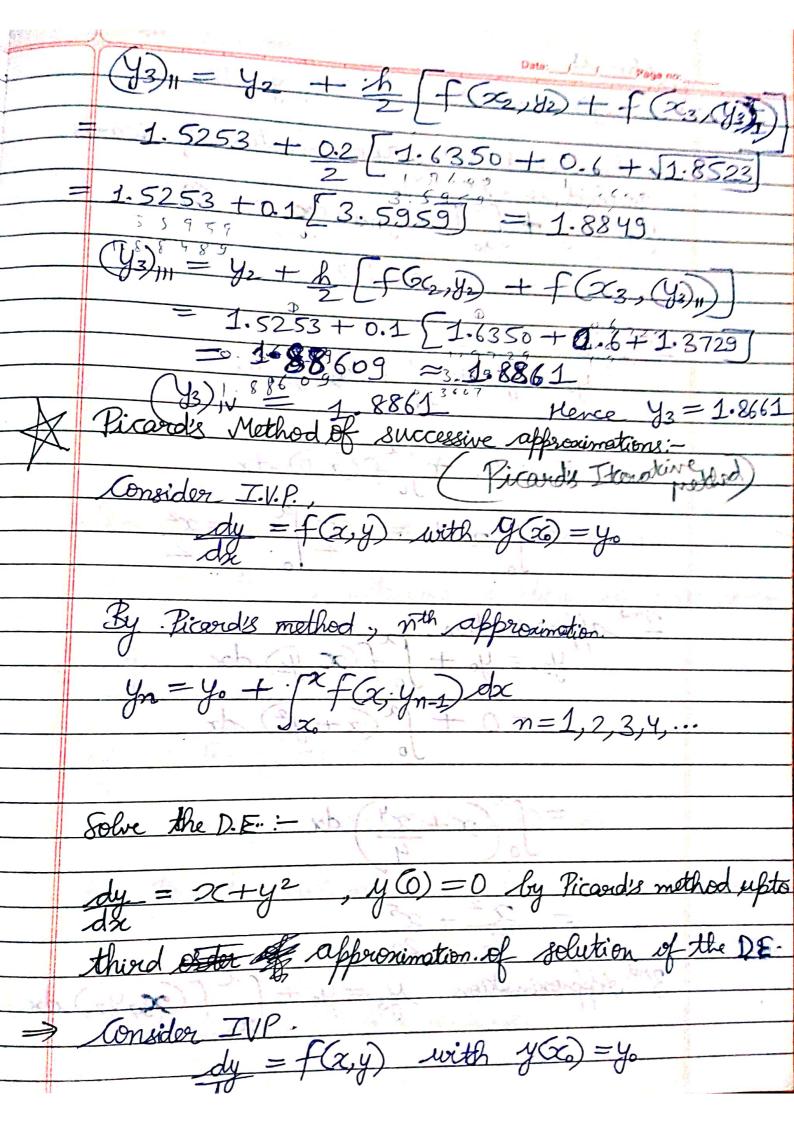


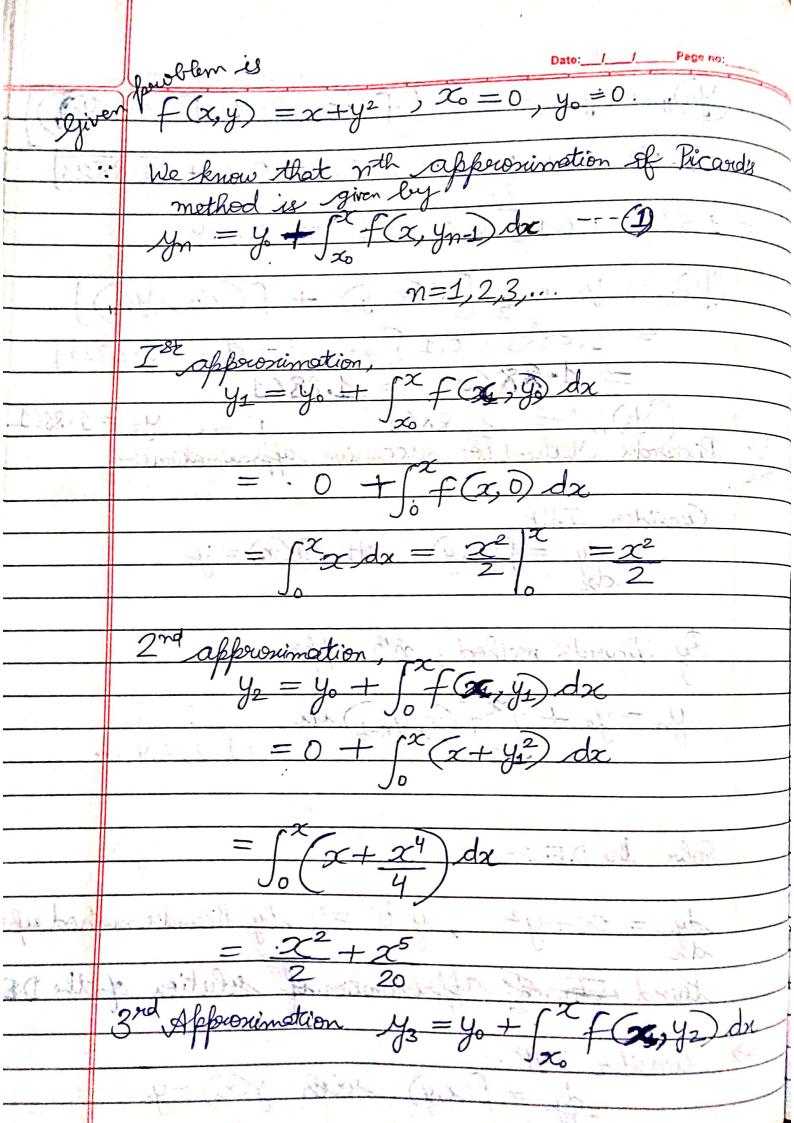
II offerimation. Now: $\chi = \chi_1 + h = 0.1 + 0.1 = 0.1$ 1/2 = 1/2 + hf (x2, y2) $= 1.5 + 0.1 [1 - x_1 + 4y_2]$ $= 1.5 + 0.1 [1 - 0.1 + 4x_1.5]$ = 2.19 $\therefore y(0.2) = 2.19$ $\therefore y(0.2) = 2.19$ 25 | 2 | 20
Fulars Modified Mothed

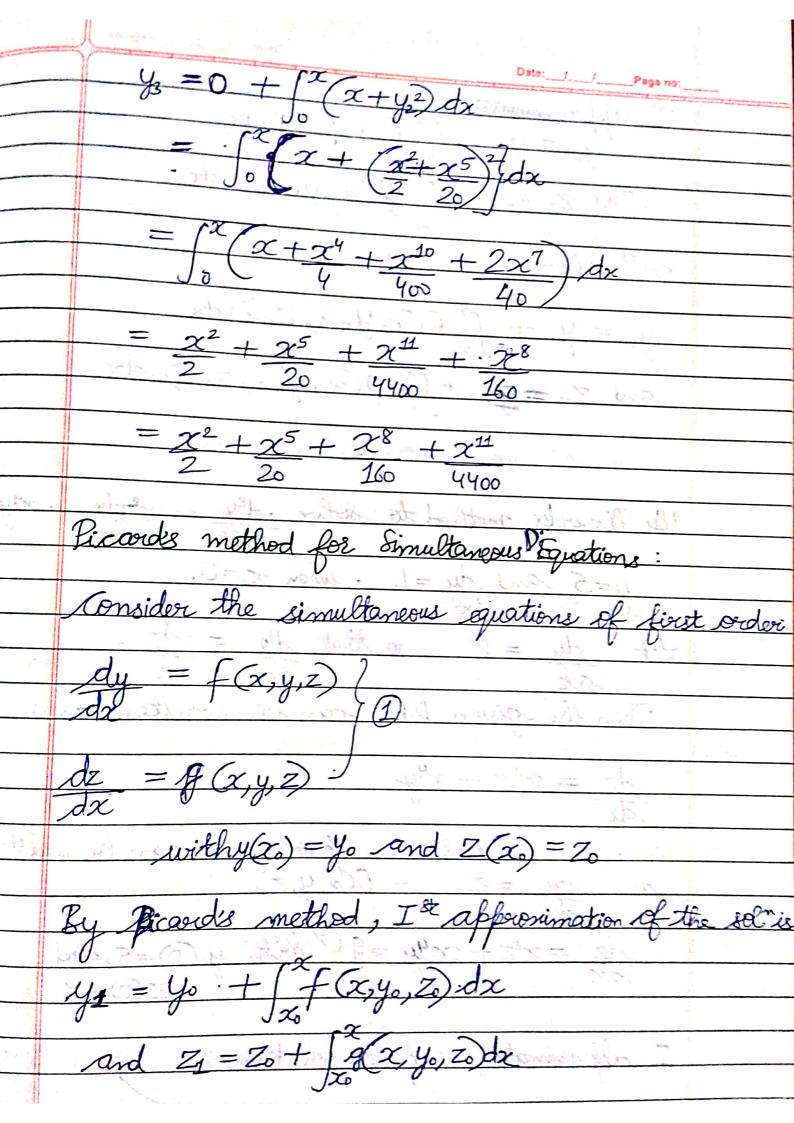
Obvider the TVP. $dy = f(x,y) \text{ with } y(x_0) = y_0$ dxyn = yn-1 + hf(xn-1, yn-1) n=1 ym = yn + h [fan 1, ym) + fa, ym 1) Ming Eulery Method; obtain a solr of the eq. $dy = x + \sqrt{y}$ With the initial condition y = 1 at x = 0 for the songe $0 \le x \le 0.6$ in steps of 0.2

correct upto . 4 places of decimals. $\chi_0 = 0$, $y_0 = 1$, $h = 0.2$
places of decimals.
h = 0.2
AT AT
$x_1 = x_0 + h = 0 + 0.2 = 0.2$
At 10
At $z=0.2$
$(y_1)_1 = y_0 + hf(x_0, y_0)$
$= 1 + 0.2[0 + \sqrt{1}] = 1.2$
The state of the s
$(y_1)_{\mathbf{I}} = y_0 + f \left[f(x_0) \right] + f(x_0)$
$(y_1)_{\mathbf{I}} = y_0 + \frac{1}{2} \left[f(x_0, y_0) + f(x_1, y_0) \right]$
54. 5 lb = 1
$= 1 + 0.2 \left[0 + 1.11 \right] + 0.2 + \left[1.21 \right]$
12.5
= 1 + 0.1 [1 + 0.2 + 1.0954] = 1.2295
(.155)
$(U) = Y_0 + 2 \int (C_{\infty} + C_{\infty} + C_{\infty})$
$(y_{1})_{111} = y_{0} + \frac{1}{2} \left[f(x_{0}, y_{0}) + f(x_{1}, y_{0}) \right]$
$=1+0.2\left[0+ \sqrt{1} +0.2+(\sqrt{1.2295})\right]$
2 (1121 1012 1 (1233)
=1.2309 12 mm (N) = /
(y) = yo+h [f(xo,y)+f(xo,y))
2 / / / / / / / / / / / / / / / / / / /
= 1.2309
(1) m = (12)N
4200 y = 4(2) = 4(0.2) = 1.2309
D (12) - 1.2301
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March while it was it desirable to the
$\sqrt{900}$ $x_2 = x_1 + h = 0.2 + 0.2 = 0.4$
therefore at $x = 0.4$
$f(x_1, y_2) = 0.2 + \sqrt{1.2369}$
Therefore at $x = 0.4$. $f(x_1, y_1) = 0.2 + \sqrt{1.2369}$ $(y_2)_T = y_1 + hf(x_1, y_1) = 0.2 + 1.1094$ $= 1.3094$
$= 1.2309 + 0.2 \left[0.2 + 1 \sqrt{1.2309} \right]$ $= 1.4927$
= 1.4927
300 = 10/1 m 10000 = 300
(42) = 4+ f (x2,42) -+ f(x2,42)
The state of the s
= 1.5240
(1) - (1) - (1) + (1) + (1) (1) = (1)
(y2)11 = y1 + h [f(x1,y1) + f(x2,(y2)11)]
==1.5253.0+11.0+1
(y) = y, b fee D 1156 00
(42) v = 4+ h [f(x2,4) + f(x2,4) m]
H=1.01.5253.1 + 1] s.a + 1
(42) 11 = (42) 1 Hence y = 1.5253
low, 3 = 22+h = 04+0.2 = 0.6
No. 1 No. 1
(y2)= -y2 + hf(26, y2)
$= 1.5253 + 0.2 \left[0.4 + \sqrt{1.5253} \right] \frac{1}{2}$ $= 1.5253 + 0.2 \left[0.4 + 1.2350 \right] \frac{1}{2}$
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -
1.5253 + 0.2 [0.4 + 1.2350]







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	I approximation is $y_2 = y_0 + \int_{x_0}^{x} f(x, y_1, \overline{x}) dx$	
	$y_2 = y_0 + \int_{-\infty}^{\infty} f(x, y_1, \overline{z}) dx$	
	Jxo	
	and $z_2 = z_0 + \int_{x_0}^{x} g(x_1, y_1, z_1) dx$	
	\int_{X_0}	
	nthaffordination is	
	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
1	$y_n = y_0 + \int_{x_0}^{x} f(x_0 y_{n-1}, z_{n-1}) dx$	
	Jxo Jxo	
	and $Z_n \pm Z_0 + \int_{X_0}^{\infty} g(G(y_{n-1}, Z_{n-1}) dx$	
	Jx0 (2) yn-1, 2n-1) MC	
	where $m = 1, 2, 3,$	
9	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	Use Picardes mother to solve 1eu ?!	<u></u>
	Use Picards method to solve dey = xedy +	-27y
	y=5 and $dy=1$: when $x=0$.	
10 J	I sensitive the simultaneous set lives	
	Let dy = Z. so that dy = : dz.	
	de de de	
i Ž∧a	Then the given D.E. can be written as	
		•
	$\frac{dz}{dz} = x^2 z + x^4 y$	
-	dx	
	: - Given initial value problem can be wri	tton
	ou du = 7 - [(v u z)	Mark
	da Frige	
26	da - 22 + 244 - 9 (21, 81, 12) - 5 and	
	$\frac{dz}{dx} = x^2z + xy = 9^{(x,y^2)} \text{ with } y(0) = 5 \text{ and}$	
	ZWF1.	
	T 10 . +	
	I approximation. of the solution is	
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