



(An Autonomous Institution) Coimbatore-641035
Department Of Mathematics

UNIT 4 – Interpolation , Numerical Differentiation and Integration

Newton's integnation by traperoidal, simps 1 rule and 3 rule: Tnaperoidal nule: y dx = 1 {(yo+90)+2(y,+42+... 40) = 1 (A+2B) where, p > 1st and sum of the 1st an last prdinates B=) sum of the remaining ordinate





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Simpson
$$\frac{1}{3}$$
 rule: (Even intervals).

 $\int_{3}^{2} y \, d\alpha = \frac{h}{3} \left\{ (y_0 + y_n) + 2(y_2 + y_4 + y_5 + \cdots y_{n-2}) + 4(y_1 + y_3 + \cdots y_{n-1})^2 \right\}$

$$= \frac{h}{3} \left\{ h + 2 h + 4 c^2 y \right\}.$$

where $h \Rightarrow sum$ of 1st and last co-condinate where $h \Rightarrow sum$ of even ordinates
$$c \Rightarrow sum$$
 of odd ordinates

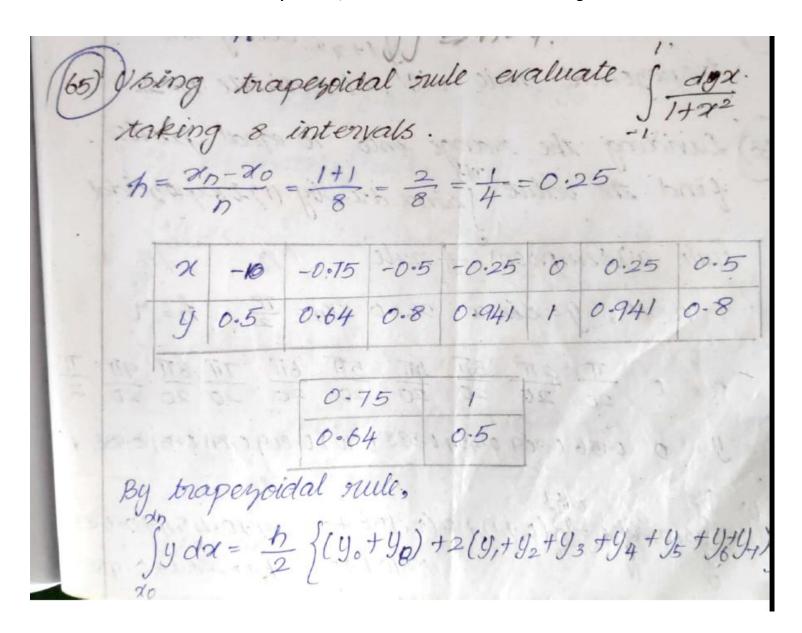




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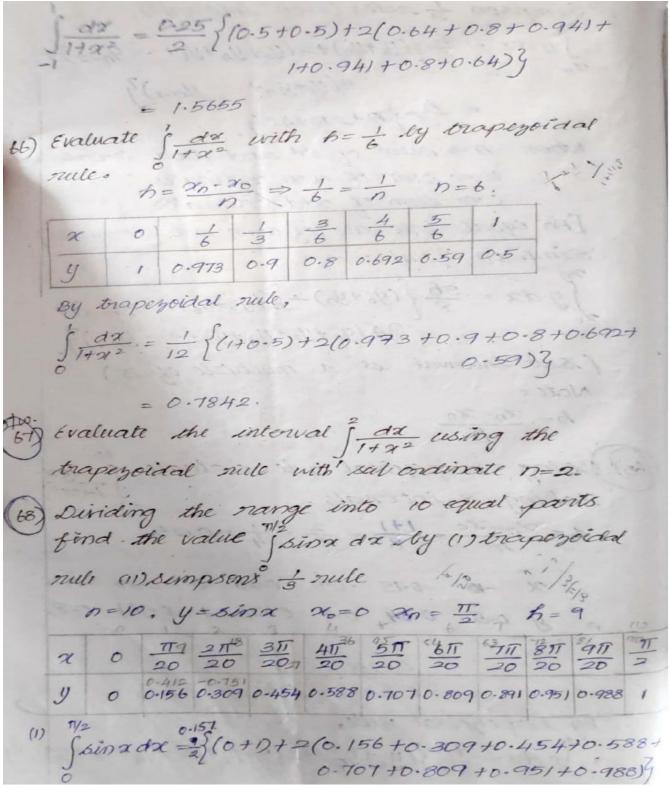






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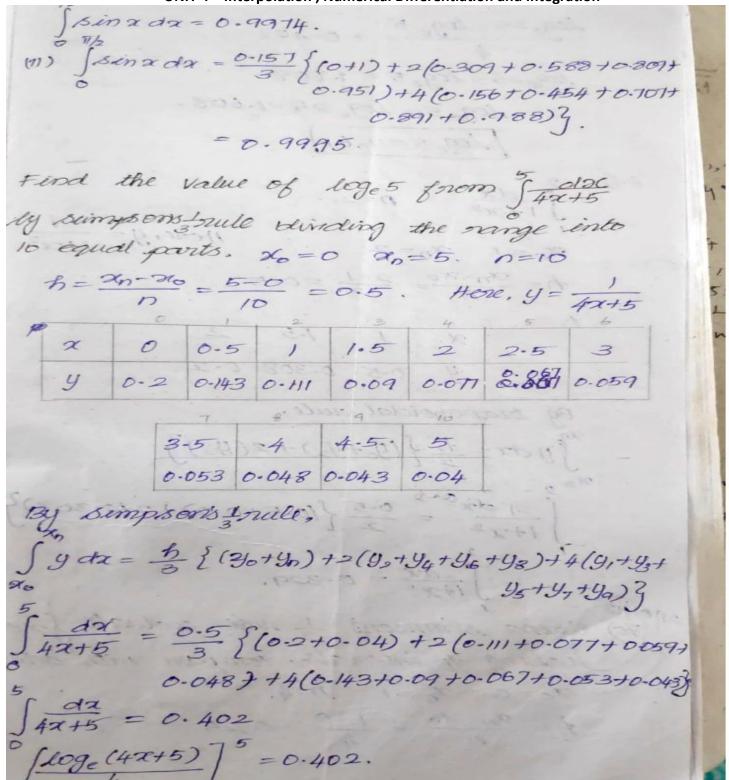






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ONIT 4 - Interpolation, Numerical Differentiation and integration
$\frac{\log_e 25 - \log_e 5}{4} = 0.402$
4 AMERICAN TENDED OF COUNTY OF
$log_e = 5 - log_e = 1.608$
$log_e 5 = log_e 25 - 1.608$.
$\left[\log_e 5 = 1-61\right]$
$\int \frac{dx}{1+x^2} \qquad n=2.$
$y_0 = 1 x_0 = 2 \qquad Here, y = \frac{1}{1+x^2}$
$\alpha_0 = 1 \alpha_0 = 2 \qquad \qquad near g = 1 + \alpha^2$
$h = \frac{\alpha_{n} - \alpha_{0}}{n} = \frac{2 - 1}{2} = 0.5$
x 1.1.5 2
4 0-5 0-308 0-2
By trapezoidal rule.
$\int_{0}^{2\pi} y dx = \frac{h}{2} \left\{ (y_0 + y_2) + 2(y_2)^{2} \right\}$
$\int_{1+\chi^2}^{100} \frac{1}{1+\chi^2} = \frac{0.5}{2} \{ (0.5+0.2) + 2(0-308)^2 \}$
$\int \frac{dx}{1+x^2} = 0.329,$
o) Osing simpsons & null evaluate fixe du
Itaking 4 intervals . compare with actual value
$\gamma_0 = 0 \gamma_0 = 1. n = 4.$
$h = \frac{\alpha_0 - 20}{n} = \frac{1 - 0}{4} = 0.25$
They recently the sail





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	. 0	1	- 2	2	4		
x	0	0.05	0.5	0.75	1,1		
		25	0.5	0.15	-		
9	0	0-321	0-824	1-588	2-718		
By simp	rsons	1 no	ile,				
				+210-	824)+4	3	
$\int x e^x dx$	11 × 10 /10	3 1		0.321+	01.588	2]	
Actual	-)	0001					
Calculate	· 015	7220	77 %	1.09.	o organ	1:	
of the same		e va	da 1	taking	7 3 0010	unaies	
by simp	$son \frac{1}{3}$	- nule	. 01	31	- (
No = 0.5					X		
h= 0.7-0	-5 = (9.05	01628	2000	7		
	0	. 1	2	3	4		
X	0.5	0.55	0.6	0.65	0.7		
9	5.429	0-428	0.425	0-421	0.415		
By simpsons & nule,							
$\int e^{-x} \sqrt{x} dx = \frac{0.05}{3} \left[(0.429 + 0.415) + 2 (0.425) \right]$							
74 (0.428+0.421)7							
	- 6	0-085	- andp			1	





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