

# Agnihotri Engg. & GATE Classes

Scripting success stories

## NUMERICAL DIFFERENTIATION & INTEGRATION

Q.8) Find  $y'$  &  $y''$  at  $x = 1$  for both parts ?

a)

x	1.0	1.1	1.2	1.3
y	0.841	0.891	0.932	0.963

 ( Ans = ; 0.5417 , )

b)

x	1	3	5	7	9
y	85.3	74.5	67.0	60.5	54.3

 ( Ans = ; -6.8085 , 1.767 )

Q.9) Find  $y'(0)$  &  $y''(0)$  from the following table ?

x	0	1	2	3	4	5
y	4	8	15	7	6	2

 ( Ans = ; -27.9 , 117.67 )

Q.10) Find first & second derivative of  $f(x)$  at  $x = 3$  for the following tabulated data?

x	3.0	3.2	3.4	3.6	3.8	4.0
y = f(x)	-14.000	-10.032	-5.296	0.256	6.672	14.000

 ( Ans = ; 3 , 18 )

Q.11) Find  $y'$  &  $y''$  at (i)  $x = 1.1$  & (ii)  $x = 1.6$

X	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

 ( Ans = ; (i) 3.952, -3.7417 (ii) 2.7477, -0.867 )

Q.12) Use Bessel's Formula to solve the following ?

a) Find first order derivative of function  $y$  at the point  $x = 4$  ?

X	1	2	4	8	10
y = f(x)	0	1	5	21	27

 ( Ans = ; 6 )

b) Find  $f'(x)$  at  $x = 0.04$  from the following data ?

x	0.01	0.02	0.03	0.04	0.05	0.06
y	0.1023	0.1047	0.1071	0.1096	0.1122	0.1148

 ( Ans = ; 0.2558 )

Q.13) Evaluate  $\int_0^5 \frac{1}{(1+x^2)} dx$  by using following methods & compare with actual value ?

(i) Trapezoidal Rule (ii) Simpson's 1/3rd Rule (iii) Simpson's 3/8th Rule (iv) Weddle's rule

( Ans = ; 1.4108 , 1.3662 , 1.3571, 1.3735 & actual value is 1.4056 )

Q.14) Use Simpson 1/3rd rule to find value of  $\int_1^5 f(x) dx$  for given table ?

x	1	2	3	4	5
f(x)	10	50	70	80	100

 ( Ans = ; 256.667 )

Q.15) Use Simpson's 3/8th rule to obtain an approximate value of  $\int_0^{0.3} (1 - 8x^2)^{1/2} dx$  ( Ans = ; 0.29159 )

Q.16) Find  $\int_0^{0.6} e^{-x^2} dx$  by taking 7 ordinate by using Simpson's 1/3rd rule? ( Ans = ; 0.5353 )

Q.17) Calculate Approximate value of  $\int_0^{\pi/2} \sin x \, dx$  by dividing into 10 parts (a) Trapezoidal Rule (ii) Simpson's 1/3<sup>rd</sup> rule? ( Ans = ; 0.9981 , 1.0006 )

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**ADDRESS: AEGC, INFRONT C.M. HOUSE , SHERPURA, VIDISHA -7415712500**

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