Simson 1/3rd rule:- Let the interval [a,b] be divided into n equal subinterval such that $a=x_0<x_1<x_2 \ldots x_n=b$ where $x_n=x_0+nh$

∴ simson 1/3rd rule is given by

$$I=\int_{x_0}^{x_n} y\,dx=\frac{h}{3}\left[y_0+4(y_1+y_3+\cdots y_{n-1})+2(y_2+y_4+\cdots y_{n-2})+y_n\right]$$

Q: A solid of revolution is formed by rotating about x-axis the area between the x-axis, x=0 and x=1 and curve through the points with the following coordinates.

x	0.00	0.25	0.50	0.75	1.00
y	1.0000	0.9896	0.9589	0.9089	0.8415

Estimate the volume of the solid form giving the Answer to 3 decimal places.

If V is the volume of solid formed, then we know that

$$V=\pi\int y^2\,dx$$

Hence, we need the values of y^2 and these tabulated below: (correct to four decimal pl.

x	y
0.00	1.0000
0.25	0.9793
0.50	0.9195
0.75	0.8261
1.00	0.7081

with h=0.25 Simson's Rules.

Date : / /
Page No.:

$$V = \frac{\pi(0.25}{3}\Big)\,[1.0000 + 4(0.9793 + 0.8201) + 2(0.9195 + 0.7081)]$$

$$= 2.8192$$

Simson 3/8th Rule (n=3)

$$I = \int_{a=x_0}^{b=x_n} y\,dx = \frac{3h}{8}\left[(y_0 + y_n) + 3(y_1 + y_2 + y_4 + y_5 + \cdots y_{n-1}) + 2(y_3 + y_6 + y_9 \cdots y_{n-3}) + y_n\right]$$

(n should be multiple of 3

Q. Evaluate $\int_0^6 \frac{1}{1+x^2}$ by using Simsons 3/8th Rule.

$h = 0$

$h = \frac{6-0}{6} = 6/6 = 1$

X	0	1	2	3	4	5	6
Y	1	0.5	0.2	0.1	0.0588	0.0385	0.027

$$I = \int_0^6 y\,dx = \frac{3h}{8}\left[y_0 + 3(y_1 + y_2 + y_4 + y_5) + 2(y_3) + y_6\right]$$

$$= \frac{3(1)}{8}\left[1 + 3(0.5 + 0.2 + 0.0588 + 0.0385) + 2(0.1) + 0.027\right]$$

$$= 1.3571$$