

Q1 Estimate  $\int_{0.5}^{1.3} 2x^3$

use trapezoidal rule a strip with  $\Delta x = 0.2$ .

Sol:-

$$a = 0.5, \quad b = 1.3 \Rightarrow \Delta x = 0.2$$

Now divide the interval into  $0.2$  subinterval with following end points.

$$a = 0.5, \quad 0.7, \quad 0.9, \quad 1.1, \quad 1.3 = b.$$

$$f(x_0) = f(0.5) = 1.28$$

$$2f(x_1) = 2f(0.7) = 3.265$$

$$2f(x_2) = 2f(0.9) = 4.496$$

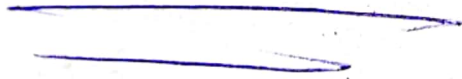
$$2f(x_3) = 2f(1.1) = 6.107$$

$$2f(x_4) = f(1.3) = 5.419$$

$$\int_{0.5}^{1.3} 2x^3 = \frac{\Delta x}{2} [f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + 2f(x_4)]$$

$$= \frac{0.2}{2} [1.28 + 3.215 + 4.496 + 6.767 + 5.419]$$

$$\int_{0.5}^{1.03} e^{x^2} = 2.0117 \text{ ANS}$$



Q) Use Simpson's rule & stop with error 0.1.

$$\int_{0.5}^{1.3} e^x$$

Sol:-

$$a=0.5, \quad b=1.3, \quad \Delta x=0.1$$

$$x=0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3$$

$$f(x_0) = f(0.5) = 1.648$$

$$f(x_1) = f(0.6) = 1.822$$

$$f(x_2) = f(0.7) = 2.013$$

$$f(x_3) = f(0.8) = 2.225$$

$$f(x_4) = f(0.9) = 2.458$$

$$f(x_5) = f(1.0) = 2.718$$

$$f(x_6) = f(1.1) = 3.004$$

$$f(x_7) = f(1.2) = 3.320$$

$$f(x_8) = f(1.3) = 3.669$$

$$\int_{0.5}^{1.5} e^{x^2} = \frac{\Delta x}{3} [f(x_0) + 4f(x_1) + 2f(x_2) + 4$$

$$f(x_3) + 2f(x_4) + 4f(x_5) + 2f(x_6)$$

$$+ 4f(x_7) + f(x_8)]$$

$$= \frac{0.1}{3} [1.28 + 4(1.433) + 2(1.633)$$

$$+ 4(1.869) + 2(2.248) + 4(2.718)$$

$$+ 2(3.53) + 4(4.221) + 5.419]$$

$$\int_{0.5}^{1.5} e^{x^2} = 20.075$$