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sect A

Quis # 1

Numerical Analysis

Estimate:- $\int_{0.5}^{1.3} e^{x^2}$

use trapezoidal Rule
a strip width
0.2

solutions:-

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

Now divide the interval
of into 0.2 subinterval
of into 0.2 end point

end point

$$a = 0.5 \Rightarrow 0.7, 0.9, 1.1, 1.3 = b$$

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

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

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

$$2f(x_3) = 2f(1.1) = 6.787$$

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

$$\int_{0.5}^{1.3} e^{x^2} dx = \frac{\Delta x}{2} (f(x_0) + 2f(x_1) + 2f(x_2) + f(x_3))$$

$$\int_{0.5}^{1.3} e^{x^2} = \frac{0.2}{2} [1.28 + 2 \cdot 6.5 + 4 \cdot 4 + 6.707 + 5.419]$$

$$\int_{0.5}^{1.3} e^{x^2} = 2.1167$$

Required Ans 2.1167

2) Use Simpsons Rule a strip width

0.1

$$\int_{0.5}^{1.3} e^{x^2}$$

Sol: $a = 0.5, b = 1.3, \Delta x = 0.2$

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

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

$$f(x_1) = f(0.6) = 1.983$$

$$\left. \begin{array}{l} h_0 = 0.5 \\ h_1 = 0.6 \end{array} \right\}$$

$$f(x_2) = f(0.7) = 1.633$$

$$x_0 = 0.7$$

$$f(x_3) = f(0.8) = 1.896$$

$$x_3 = 0.8$$

$$f(x_4) = f(0.9) = 2.248$$

$$x_4 = 0.9$$

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

$$x_5 = 1.0$$

$$f(x_6) = f(1.1) = 3.353$$

$$x_6 = 1.1$$

$$f(x_7) = f(1.2) = 4.221$$

$$x_7 = 1.2$$

$$f(x_8) = f(1.3) = 5.419$$

$$\int_{0.5}^{1.3} e^{x^2} dx = \frac{dx}{3} \left(f(x_0) + f(x_1) + 2f(x_2) + 4f(x_3) + \right.$$

$$\left. 2f(x_4) + 4f(x_5) + 2f(x_6) + 4f(x_7) + f(x_8) \right)$$

$$= \frac{0.1}{3} \left(1.28 + 4(1.433) + 2(1.633) + 4(1.896) + 2(2.248) + \right.$$

$$\left. 4(2.718) + 2(3.353) + 4(4.221) + 5.419 \right)$$

$$\int_{0.5}^{1.3} e^{x^2} = \frac{0.1}{3} (62.159)$$

$$= \int_{0.5}^{1.3} e^{x^2} = 0.33 (62.159)$$

$$\int_{0.5}^{1.3} e^{x^2} = 20.71$$

Answer