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Subject : Numerical Analysis

Quiz # "1"

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1) Estimate $\int_{0.5}^{1.3} e^{x^2}$

Use trapezoidal rule a strip with
0.2

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

Now divide the interval of into
0.2 Subinterval with the following
end point

$a = 0.5$, ~~$b =$~~ , $0.7, 0.9, 1.1, 1.3 = b$

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

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

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

$$2f(x_3) = 2f(1.1) = 6.707$$

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

$$x_0 = 0.5$$

$$x_1 = 0.7$$

$$x_2 = 0.9$$

$$x_3 = 1.1$$

$$x_4 = 1.3$$

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

$$\int_{0.5}^{1.3} e^{x^2} = \frac{0.2}{2} [1.28 + 3 \cdot 2.65 + 4 \cdot 4.98 + 6 \cdot 7.07 + 5.419]$$

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

Required Ans 2.1167

2) Use Simpson's Rule a strip width

$$0.1$$

→

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

Sol:

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

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

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

$$f(x_1) = f(0.6) = 1.433$$

$$x_0 = 0.5$$

$$x_1 = 0.6$$

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

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

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

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

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

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

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

$$x_2 = 0.7$$

$$x_3 = 0.8$$

$$x_4 = 0.9$$

$$x_5 = 1.0$$

$$x_6 = 1.1$$

$$x_7 = 1.2$$

$$x_8 = 1.3$$

$$\int_{0.5}^{1.3} e^{x^2} = \frac{\Delta x}{3} [f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + 2f(x_4) + 4f(x_5) + 2f(x_6) + 4f(x_7) + f(x_8)]$$

$$= \frac{0.1}{3} [1.28 + 4(1.433) + 2(1.633) + 4(1.896) + 2(2.248) + 4(2.718) + 2(3.353) + 4(4.221) + 5.419]$$

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

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

$$\int_{0.5}^{1.3} e^{x^2} = 2.071$$

Answer:
