Macabuhs, Jan Raphael D. CPE-202 SET: X

91/100

1) Approximate Integral of function $f(x) = e^{-ax}$ where $a = 2.4$, interval $[2, 7]$

a) Trapezoidal rule

$I = (7-2)\frac{e^{-2.4(2)} + e^{-2.4(7)}}{2}$

$I = 0.020574$

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b) Simpson's Rule (1/3)

$h = \frac{7-2}{2} = \frac{5}{2}$

$x_0 = a = 2$

$x_1 = 2 + \frac{5}{2} = 9/2$

$x_2 = b = 7$

$I = \frac{5/2}{3}\left[e^{-2.4(2)} + 4(e^{-2.4(9/2)}) + e^{-2.4(7)}\right]$

$I = 0.006926$

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c) Simpson's 3/8 Rule

$h = \frac{7-2}{3} = \frac{5}{3}, x_0 = 2, x_1 = 11/3$

$x_2 = 16/3, x_3 = 7$

$I = \frac{h3}{8} \times \left(e^{-2.4(2)} + 3(e^{-2.4(11/3)}) + 3(e^{-2.4(16/3)}) + e^{-2.4(7)}\right)$

$I = 0.004928$

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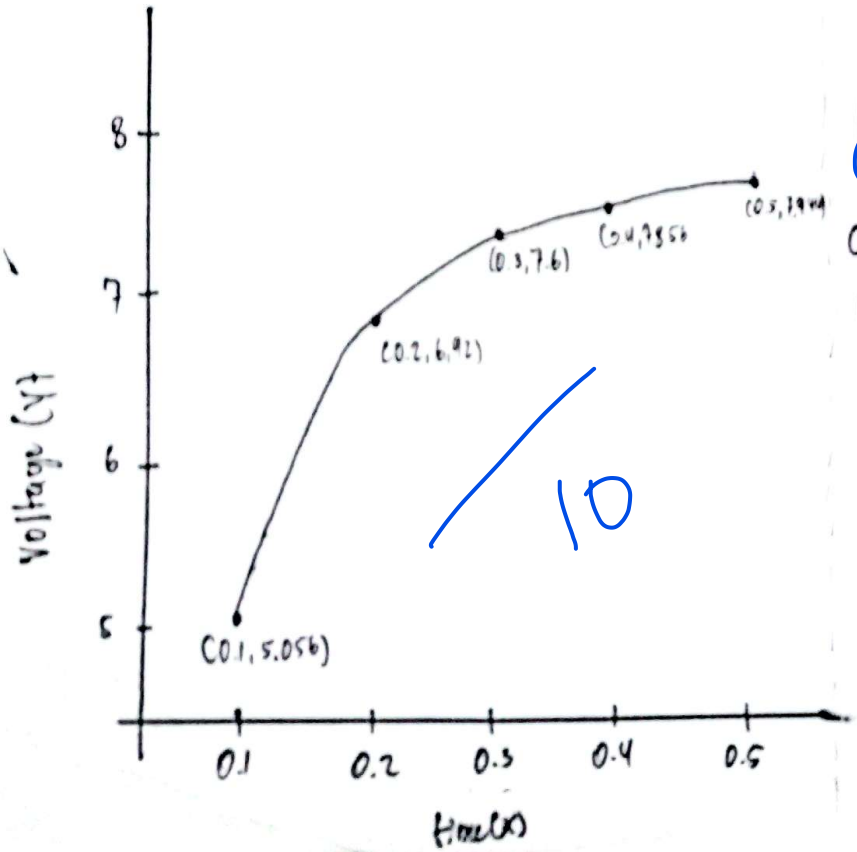
checked the answer on your code.

2) The voltage across a capacitor is initially 0V and rises to almost 8V in 0.5s. The voltage measured every 0.1s are shown on the table

Time (s)	0.1s	0.2s	0.3s	0.4s	0.5s
Volts (V)	5.056V	6.92V	7.6V	7.856V	7.944V

a) Calculate the approximate rate of change of voltage across the capacitor at 0.5s and at 0.2s

b) sketch by hand. voltage (y-axis) vs time (x-axis)



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a.1 time = 0.5s

$f'(0.5) = \frac{f(0.5) - f(0.3)}{2(0.1)}$

$= \frac{7.944 - 7.6}{0.2}$

$f'(0.5) = 1.72\ V/s$

0.04V/s

a.2 time = 0.2s

$f'(0.2) = \frac{f(0.3) - f(0.1)}{2(0.1)}$

$= \frac{7.6 - 5.056}{0.2}$

$F'(0.2) = 12.72\ V/s$

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