ENG 382 ASSIGNMENT 2

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MATRIC NO: 17/ENG06/108

DEPARTMENT: MECHANICAL ENGINEERING

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$f(x) = e^{-0.5x}(4-x) - 2$$

$$f'(x) = u = e^{-0.5x} \qquad v = 4-x$$

$$f'(x) = \frac{dy}{dx} = v\frac{du}{dx} + u\frac{dv}{dx}$$

$$f'(x) = (4-x)(-0.5e^{-0.5x}) + e^{-0.5x}(-1)$$

$$f'(x) = 0.5e^{-(0.5x)}(-x-4) - e^{-0.5x}$$

$$x_{n+1} = x_n - \frac{e^{-0.5x}(4-x) - 2}{0.5e^{-0.5x}(x-4) - e^{-0.5x}}$$

i	x	E_a
0	0.5	0
1	0.838890606	40.39211204
2	0.854955989	0.205386019
3	0.857066071	0.024673781
4	0.857343802	

$$x_{0+1} = \frac{0.5e^{-0.5(0.5)}(4-0.5)-2}{e^{-0.5(0.5)}(0.5-4)-e^{-0.5\times0.5}}$$

$$= 0.838890606$$

$$E_a\% \text{ error} = \left|\frac{x_{n+1}-x_n}{x_{n+1}}\right| \times 100\%$$

$$= \left|\frac{0.838890606-0.5}{0.838890606}\right| \times 100$$

$$= 40.39747299$$

$$x_2 = 0.838890606 - \frac{e^{-0.5(0.838890606)}(4-0.838890606)-2}{0.5e^{-0.5(0.838890606)}(0.838890606)(0.838890606-4)-e^{-0.5(0.838890606)}}$$

$$= 0.884955980$$

$$E_a = \left|\frac{0.884955980-0.838890606}{0.884955980}\right| \times 100$$

$$= 5.205386019$$

$$x_3 = 0.884955980 - \frac{e^{-0.5(0.884955980)}(4-0.884955980)-2}{0.5e^{-0.5(0.884955980)}(0.884955980-4)-e^{-0.5(0.884955980)}}$$

$$= 0.885708607 1$$

$$E_3 = \left| \frac{0.885708607 1 - 0.884955980 4}{0.885708607 1} \right| \times 100$$

$$= 0.849744706 1$$

$$K_4 = 0.885708607 1 - \frac{e^{-0.5(0.885708607 1)}}{0.5\, e^{-0.5(0.885708607 1)}} \frac{(4 - 0.885708607 1) - 2}{(0.885708607 1 - 4)}$$

$$= 0.885708802$$

$$E_4 = \left| \frac{0.885708802 - 0.885708607 1}{0.885708802} \right| \times 100$$

$$= 2.200497405 \times 10^{-5}$$