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Department: Computer Engineering

Course: Eng 352

### Assignment 2

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

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

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

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

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

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

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

	$x$	$E_a$
0	0.5	0
1	0.838890606	40.39747299
2	0.8849559809	5.205386019
3	0.8857086071	0.08497447061
4	0.885708802	

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

$$= 0.838890606$$

$$E_a \% \text{ Error} = \left[ \frac{x_{n+1} - x_n}{x_{n+1}} \right] \times 100\%$$

$$= 0.838890606 - 0.5 \times 100$$

$$0.838890606$$

$$= 40.39747299$$

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

$$= 0.8849559809$$

$$E_a = \left| \frac{0.8849559809 - 0.838890606}{0.8849559809} \right| \times 100$$

$$x_3 = 0.8849559809 - e^{-0.5(0.8849559809)} (4 - 0.8849559809) - 2$$
$$0.5e^{-0.5(0.8849559809)} (0.8849559809 - 4) - e^{-0.5(0.8849559809)}$$

$$= 0.8857086071$$

$$E_a = \left| \frac{0.8857086071 - 0.8849559809}{0.8857086071} \right| \times 100 = 0.8497447061$$

$$x_4 = 0.8857086071 - e^{-0.5(0.8857086071)} (4 - 0.8857086071) - 2$$
$$0.5e^{-0.5(0.8857086071)} (0.8857086071 - 4) - e^{-0.5(0.8857086071)}$$

$$= 0.885708802$$

$$E_a = \left| \frac{0.885708802 - 0.8857086071}{0.885708802} \right| \times 100$$

$$= 2.200497495 \times 10^{-5}$$

$$x_5 = 0.885708802 - e^{-0.5(0.885708802)} (4 - 0.885708802) - 2$$
$$0.5e^{-0.5(0.885708802)} (0.885708802 - 4) - e^{-0.5(0.885708802)}$$

$$= 0.885708802$$

$$E_a = \left| \frac{0.885708802 - 0.885708802}{0.885708802} \right| \times 100 = 0$$