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DEPT: MECHANICAL ENGINEERING

COURSE CODE: ~~ENME 352~~ ENME 352

ASSIGNMENT 1

$$1) f(x) = e^{-0.5x} (4-x) - 2$$

$$f(x) = 2 - 2e^{-0.5x} \quad \left| \begin{array}{l} -0.5x \\ +0.5e^{-0.5x} \end{array} \right| = 2$$

$$x_1 + 1 = \frac{2e^{-0.5x} (4-x) - 2}{-3e^{-0.5x} + 0.5e^{-0.5x} x}$$

$$x_1 = \frac{0.5 - e^{-0.5(0.5)} (4-0.5) - 2}{-3e^{-0.5(0.5)} + 0.5e^{-0.5(0.5)} (0.5)}$$

$$= 0.838890606$$

$$\text{error}_1 = \left| \frac{0.838890606 - 0.5}{0.838890606} \right| \times 100 = 40.39745865$$

$$x_2 = 0.838890606 - \frac{e^{-0.5(0.838890606)} (4-0.838890606) - 2}{-3e^{-0.5(0.838890606)} + 0.5e^{-0.5(0.838890606)} (0.838890606)}$$

$$= 0.8849559424$$

$$\text{error}_2 = \left| \frac{0.8849559424 - 0.838890606}{0.8849559424} \right| \times 100 = 5.205381897$$

$$x_3 = 0.8849559424 - \frac{e^{-0.5(0.8849559424)} (4-0.8849559424) - 2}{-3e^{-0.5(0.8849559424)} + 0.5e^{-0.5(0.8849559424)} (0.8849559424)}$$

$$= 0.8857683129$$

$$\text{error}_3 = \left| \frac{0.8857683129 - 0.8849559424}{0.8857683129} \right| \times 100$$

$$= 0.08499562866$$

$$x_4 = 0.8857683129 - \frac{e^{-0.5(0.8857683129)} (4-0.8857683129) - 2}{-3e^{-0.5(0.8857683129)} + 0.5e^{-0.5(0.8857683129)} (0.8857683129)}$$

$$= 0.885708802$$

$$\text{Error 4} = \left| \frac{0.885708802 - 0.8857083129}{0.885708802} \right| \times 100 = 5.522130963 \times 10^{-3}$$

$$x_5 = 0.885708802 - \frac{e^{-0.5(0.885708802)} - 3e^{-0.5(0.885708802)}}{1 - 10.5e^{-0.5(0.885708802)}} = 0.885708802$$

$$\text{Error 5} = \left| \frac{0.885708802 - 0.885708802}{0.885708802} \right| \times 100 = 5.394218816 \times 10^{-10}$$

Due to the max error given as  $10^{-9}$ , we will have to stop at the 5th error.

i	x	Error
0	0.5	
1	0.838890606	4.039745853
2	0.8849559424	5.205381897
3	0.8857083129	0.0849956
4	0.885708802	5.522130963 $\times 10^{-5}$
5	0.885708802	5.394218816 $\times 10^{-10}$