Name: Pepple Ibim Obielima
Matric no: 16/ENG06/088
Department: Mechanical

Assignment

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

$f'(x) = -3e^{-0.5x} + 0.5e^{-0.5x}x$

$x_{i+1} = x_i - \dfrac{e^{-0.5x}(4-x)-2}{-3e^{-0.5x} + 0.5e^{-0.5x}x}$

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

$= 0.838890606$

$\text{error}_1 = \left| \dfrac{0.838890606 - 0.5}{0.838890606} \right| \times 100 = 40.39745855$

$x_2 = 0.838890606 - \dfrac{e^{-0.5(0.838890606)}(4 - 0.838890606) - 2}{-3e^{-0.5(0.838890606)} + 0.5^{-0.5(0.838890606)}(0.838916068)}$

$= 0.884955424$

$\text{error}_2 = \left| \dfrac{0.884955424 - 0.838890606}{0.884855424} \right| \times 100 = 5.205381897$

$x_3 = 0.838890 6 - \dfrac{e^{-0.5(0.884959424)}(4 - 0.884959424) - 2}{-3e^{-0.5(0.884959424)} + 0.5^{-0.5(0.884955944)}(0.884955424)}$

$= 0.885708802$... $= 0.8857083129$

$\text{error}_3 = \left| \dfrac{0.8837083129 - 0.88495594124}{0.8857083129} \right| \times 100 = 0.08494562886$

$x_4 = 0.8857083129 - \dfrac{e^{-0.5(0.8357083124)}(4 - 0.8857083129) - 2}{-3e^{-0.5(0.885283129)} + 0.5e^{-0.5(0.8837083305)}(0.8857083129)}$

$= 0.8857083802$

$\text{error}_4 = \left| \dfrac{0.885708802 - 0.8857083129}{0.8857083802} \right| \times 100$

$= 5.532130963 \times 10^{-5}$

$x_5 = 0.885708802 - \dfrac{e^{-0.5(0.85708802)}(4 - 0.885708802) - 2}{-3e^{-0.5(0.885708802)} + 0.5e^{-0.5(0.885708802)}(0.885708802)}$

$= 0.885708802$

$$\text{error}_5 = \left| \frac{0.885708802 - 0.885708802}{0.885708802} \right| \times 100$$

$$= 5.394210816 \times 10^{-10}$$

Due to maximum percentage error given as $1 \times^{-9}$ we will stop at the 5th iteration

i	x	error
0	0.5	
1	0.838890606	40.39745855
2	0.8849659124	5.205381847
3	0.8857083129	0.08499562866
4	0.885708802	$5.522130963 \times 10^{-5}$
5	0.885708802	$5.394218816 \times 10^{-10}$