Ors: Emmanuel Chukwuemeka
16/Eng06/060
Mechanical

Assignment II

$$F(x) = e^{-0.5x} \times (4-x) - 2$$
$$f'(x) = e^{-0.5x}(-1) - (4-x) \times 0.5$$
$$e^{-0.5x} \times (1 + 0.5 \times (4-x))$$

Applying newton Raphson iteration Method using initial guess of $x = 0.5$

$$x_{i+1} = x_i - (f(x_i)/f'(x_i))$$
$$x_{i+1} = 0.5 - \frac{e^{-0.5(0.5)} \times (4-0.5) - 2}{e^{-0.5(0.5)} \times (3 - 0.5(0.5))}$$

$$= 0.83889606$$

$$x_{i+1} = 0.83889606 - \left[\frac{e^{-0.5(0.83889606)} \times (4 - 0.83889606) - 2}{e^{-0.5(0.83889606)} \times (3 - 0.5(0.83889606))}\right]$$

$$= 0.88495603$$

$$x_{i+1} = 0.88495603 - \left[\frac{e^{-0.5(0.88495603)} \times (4 - 0.88495603) - 2}{e^{-0.5(0.88495603)} \times 3 - 0.5(0.88495603)}\right]$$

$$= 0.88570805$$

$$x_{i+1} = 0.88570805 - \left[\frac{e^{-0.5(0.88570805)} \times (4 - 0.88570805) - 2}{e^{-0.5(0.88570805)} \times (3 - 0.5)(0.88495603)}\right]$$

$$= 0.88570802$$

Absolute Error is given as

$$E_a = |x_{i+1} - x_i / x_{i+1}| \times 100$$

$$E_a = |0.83889606 - 0.5 / 0.83889606| \times 100$$

$$40.39747299$$

$\varepsilon_a = \left| \frac{0.884956003 - 0.83890606}{0.83890606} \right| \times 100$

$= 5.208388097\%$

$\varepsilon_a = \left| \frac{0.885708802 - 0.885708605}{0.885708802} \right| \times 100$

$= 2.224207319 \times 10^{-5}\%$

$\varepsilon_a = \left| \frac{0.885708802 - 0.885708605}{0.885708802} \right| \times 100 = 0.$

i	$x_i + l$	ε_a
0	0.5	
1	0.83890606	40.39747299
2	0.884956003	5.208388097
3	0.885708605	0.084972043337
4	0.885708802	2.224207×10^{-5}
5	0.885708800	0