SANNI DAYO A
ELECT/ELECT
17/ENG04/052

$f(x) = e^{-0.5x}(4-x) - 2$ —— ①

using newton Raphson method

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

$U = e^{-0.5x}$ $V = 4-x$

$U' = -0.5 e^{-0.5x}$

$V' = -1$

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

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

$f(x) = 0$ $x_i = 0.5$

recall

$$x_{i+1} = 0.5 - \frac{e^{-0.5x_i}(4-x_i) - 2}{-e^{-0.2x_i} - 0.5 e^{-0.5x_i}(4-x_i)}$$

$$x_{i+1} = 0.5 - \frac{-0.7258 \cdot 027407}{2.141702158}$$

~~$x_{i+1} = 0.5 \dots$~~

$x_{i+1} = 0.8388906061$

$$\% \text{ error} = \left| \frac{0.8388906061 - 0.5}{0.8388906061} \right| \times 100\%$$

$= 0.40377493 \times 100$

≈ 40.39

(1) $x_{\text{new}} = 0.8388906061$

$$x_{(i+1)} = 0.8388906061 - \frac{e^{-0.5x}(4-x) - 2}{e^{-0.5(x)}(0.5x - 3)}$$

$$x_{(i+1)} = 0.8388906061 - \frac{0.028147297}{-1.676486052}$$

$x_{(i+1)} = 0.8849566003$

$$\text{Error} = \left| \frac{0.8849566003 - 0.8388706061}{0.884957000S} \right| \times 100$$

$= 5.20538808$

$$\text{error} = \left| \frac{0.88570860 - 0.88495600}{0.88570860} \right| \times 100$$

$$= 0.08497204337$$

when $x = 0.88570860$

$$x(i+1) = 0.88570860 - \frac{3.23521409 \times 10^{-2}}{-1.64226929}$$

$$= 0.88370850$$

$$\text{Error} = \left| \frac{0.88570880 - 0.88570860}{0.88570880} \right| \times 100$$

$$= 2.2420731 \times 10^{-5}$$

when $x = 0.88570880$

$$x(i+1) = 0.88570880 - \frac{7.846 \times 10^{-12}}{-1.64226704}$$

$$= 0.88570880$$

$$\text{error} = \left| \frac{0.88570880 - 0.88570880}{0.88570880} \right| \times 100$$

$$= 0$$

x	$x(i+1)$
0.5	0.8388906061
0.8388906061	0.88495600
0.88495600	0.88570860
0.88570860	0.88570880
0.88570880	0.88570880