

Assignment 2

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

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

$$f'(x) = -e^{-0.5x} - 2e^{-0.5x} + 0.5xe^{-0.5x}$$

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

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

$$f(x) \neq$$

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$$

when $x = 0.5$

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

$$x_1 = 0.838890606$$

when $x = 0.838890606$

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

$$x_2 = 0.88496$$

$$x_3 = 0.88496 - \frac{e^{-0.5 \times 0.88496} (4 - 0.88496) - 2}{(0.5 \times 0.88496 e^{-0.5 \times 0.88496}) - (3e^{-0.5 \times 0.88496})}$$

$$x_3 = 0.88571$$

when $x_3 = 0.88571$

$$x_4 = 0.88571 - \frac{e^{-0.5 \times 0.88571} (4 - 0.88571) - 2}{(0.5 \times 0.88571 e^{-0.5 \times 0.88571}) - (3e^{-0.5 \times 0.88571})}$$

$$x_4 = 0.88571$$

when $x_4 = 0.88571$

$$x_5 = 0.88571 - \frac{e^{-0.5 \times 0.88571} (4 - 0.88571) - 2}{(0.5 \times 0.88571 e^{-0.5 \times 0.88571}) - (3e^{-0.5 \times 0.88571})}$$

$$x_5 = 0.88571$$

when $x = 0.88571$

$$x_6 = 0.88571 - \frac{e^{-0.5 \times 0.88571} (4 - 0.88571) - 2}{(0.5 \times 0.88571 e^{-0.5 \times 0.88571}) - (3e^{-0.5 \times 0.88571})}$$

$$x_6 = 0.88571$$

for error

$$\epsilon_a = \left| \frac{x_{i+1} - x_i}{x_{i+1}} \right| \times 100\%$$

$$\epsilon_a = \frac{0.8388906 - 0.5 \times 100\%}{0.8388906}, \quad \epsilon_a = 40.397\%$$

$$\epsilon_{a2} = \frac{0.88496 - 0.8388906}{0.88496} \times 100\%$$

$$\epsilon_{a2} = 5.205\%$$

$$\epsilon_{a3} = \frac{0.8857 - 0.88496}{0.8857} \times 100\% = 0.0849\%$$

$$\epsilon_{a4} = \frac{0.88571 - 0.8857}{0.88572} \times 100\% = 2.224 \times 10^{-5}\%$$

$$\epsilon_{a5} = \frac{0.88571 - 0.88571}{0.88571} \times 100\%$$

$$\epsilon_{a5} = 0\%$$

i	x	$\epsilon_a (\%)$
0	0.5	40.397
1	0.8388906	5.205
2	0.88496	0.0849
3	0.8857	2.224×10^{-5}
4	0.88571	0
5	0.88571	0