

OTUNUYA Ismail

16/ENG05/028

ENG 352

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MECHATRONICS ENGINEERING

Assignment 2

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

Using Newton Raphson Method

$$x = g(x)$$

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

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

$$f'(x) = e^{-0.5x} (-3 + \frac{x}{2})$$

Initial guess value of 0.5 Here, $x_i = 0.5$

$$1) f(0.5) = e^{-0.5(0.5)} (4 - 0.5) - 2 = 0.7258027407$$

$$f'(0.5) = (0.5 - 6) e^{-0.5(0.5)/2} = -2.141702153$$

$$x_{i+1} = 0.5 - \frac{0.7258027407}{-2.141702153} = 0.838890606$$

2)

$$f(0.84) = e^{-0.5(0.84)} (4 - 0.84) - 2 = 0.02814929794$$

$$f'(0.84) = (0.84 - 6) e^{-0.5(0.84)/2} = -1.696486032$$

$$x_{i+1} = 0.838890606 - \frac{0.02814929794}{-1.696486032} = 0.884956003$$

3)

$$f(0.885) = e^{-0.5(0.885)} (4 - 0.885) - 2 = 0.00123657619$$

$$f'(0.885) = (0.885 - 6) e^{-0.5(0.885)/2} = -1.64306076$$

$$x_{i+1} = 0.884956003 - \frac{0.00123657619}{-1.64306076} = 0.885708605$$

4)

$$f(0.886) = e^{-0.5(0.886)} (4 - 0.886) - 2 = 0.00000323521408$$

