

Assignment 2

MAC-FTELI GOLDEN

MECHATRONICS

16/ENG05/021

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

$$x_i = 0.5$$

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

~~$$u = e^{-0.5x}$$~~

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

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

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

at $x_0 = 0.5$

$$f(x) = e^{-0.5(0.5)}(4-0.5) - 2 = 0.7258027$$

$$f'(x) = -e^{-0.5(0.5)} - 0.5e^{-0.5(0.5)}(4-0.5) = -2.1417022$$

$$x_1 = 0.5 - \frac{0.7258027}{-2.1417022} = 0.83889058$$

$$f(x_1) = e^{-0.5(0.83889058)}(4-0.83889058) - 2 = 0.07814934$$

$$f'(x_1) = -e^{-0.5(0.83889058)} - 0.5e^{-0.5(0.83889058)}(4-0.83889058)$$

$$f'(x_1) = -1.6964861$$

$$x_2 = 0.83889058 - \frac{0.07814934}{-1.6964861} = 0.8849560$$

$$f(x_2) = e^{-0.5(0.8849560)}(4-0.8849560) - 2 = 0.0001236579$$

$$f'(x_2) = -e^{-0.5(0.8849560)} - 0.5e^{-0.5(0.8849560)}(4-0.8849560) = -1.643061$$

$$x_3 = 0.8849560 - \frac{0.0001236579}{-1.643061} = 0.88570861$$

~~$$f(x_3) = e^{-0.5(0.88570861)}(4-0.88570861) - 2$$~~

$$f(x) = e^{-0.5(0.88570861)}(4-0.88570861) - 2 = 3.204469 \times 10^{-7}$$

$$f'(x) = -e^{-0.5(0.88570861)} - 0.5e^{-0.5(0.88570861)}(4-0.88570861) = -1.642201$$

$$x_4 = 0.88570861 - \frac{3.204469 \times 10^{-7}}{-1.642201} = 0.8857088051$$

$$f(x_4) = e^{-0.5(0.8857088051)}(4 - 0.8857088051) - 2 = -5.082976 \times 10^{-9}$$

$$f'(x) = -e^{-0.5(0.8857088051)} - 0.5e^{-0.5(0.8857088051)}(4 - 0.8857088051) = -1.643164$$

$$x_5 = 0.8857088051 - \frac{(-5.082976 \times 10^{-9})}{-1.643164724} = 0.885708802$$