

Basit Olatunbodeun

161ENG041043

ENG382.

Electrical Engineering Electrical

Assignment 2

$$f(x) = e^{-0.5x} (4-x) - 2 \quad x_0 = 0.5$$

using product rule

$$u = e^{-0.5x} \quad v = (4-x) - 2$$

$$\frac{du}{dx} = -0.5e^{-0.5x} \quad \frac{dv}{dx} = -1$$

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

$$\frac{dy}{dx} = \frac{-1}{2} e^{-0.5x} (4-x) - e^{-0.5x}$$

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

$$f(x_0) = e^{-0.5(0.5)} (4-0.5) - 2$$
$$= 0.7258$$

$$f'(x_0) = \frac{1}{2} e^{-0.5 \times 0.5} (0.5-4) - e^{-0.5(0.5)}$$
$$= -2.1417$$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$= 0.5 - \frac{0.7258}{-2.1417} = 0.5 - (-0.3389)$$
$$= 0.8389$$

$$\text{error} = \frac{x_1 - x_0}{x_1} \times 100 = \frac{0.83889 - 0.5}{0.83889} \times 100 =$$

$$\text{error} = 40.4\%$$

$$\text{when } x_1 = 0.83889$$

iterating

when  $i = 1$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)}$$

$$f(x_1) = e^{-0.5(0.83889)} (4-0.83889) - 2$$
$$= 0.078150$$

$$f'(x_1) = \frac{1}{2} e^{-0.5(0.83889)} (0.83889 - 4) - e^{-0.5(0.83889)}$$

$$= -1.6440$$

$$x_2 = 0.8858$$

when error  $i = 1$

$$\text{error} = \frac{x_2 - x_1}{x_2} = \frac{0.8858 - 0.83589}{0.8858} \times 100$$

$$= 0.05295 \times 100\% = 5.295\%$$

When  $i = 2$

$$f(x_2) = e^{-0.5(0.8858)} (4 - 0.8858)^{-2}$$

$$= -0.0001497$$

$$f'(x_2) = \frac{1}{2} e^{-0.5(0.8858)} (0.8858 - 4) - e^{-0.5(0.8858)}$$

$$= -1.6426$$

error

$$x_3 = x_2 - \frac{f(x_2)}{f'(x_2)}$$

$$= 0.8858 - \left[ \frac{-0.0001497}{-1.6426} \right]$$

$$= 0.8858 - 9.1124 \times 10^{-5}$$

$$= 0.8848$$