

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

solution

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

$$f(x_0) = 0.7258$$

$$f'(x_0) = \frac{dy}{dx} = -0.5(4-x)e^{-0.5x} - e^{-0.5x}$$

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

$$f'(x_0) = -2.142$$

Using Newton-Raphson iteration method

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

$$\therefore x_1 = 0.5 - \left(\frac{-0.7258}{-2.142} \right) = 0.8388$$

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

$$f(x_1) = e^{-0.5(0.8388)}(4-0.8388) - 2$$

$$f(x_1) = 0.0783$$

$$f'(x_2) = -0.5(4-0.8388)e^{-0.5(0.8388)}$$

$$f'(x_2) = -1.6966$$

$$x_2 = 0.8388 - \left(\frac{-0.0783}{1.6966} \right) = 0.884956$$

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

$$x_2 = 0.88496$$

$$f(x_2) = e^{-0.5(4 - 0.88496) - 2}$$

$$f(x_2) = 1.23 \times 10^{-3}$$

$$f'(x_2) = -0.5(4 - 0.88496)e^{-0.5 \times 0.88496}$$

$$= -1.643$$

$$x_3 = 0.885 - \left(\frac{-1.23 \times 10^{-3}}{1.643} \right)$$

$$x_3 = 0.88571$$