

Assignment 2

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

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

$$\begin{aligned} f'(x) &= -2e^{-0.5x} - e^{-0.5x} + 0.5xe^{-0.5x} \\ &= (-2-1+0.5x)e^{-0.5x} \\ &= (-3+0.5x)e^{-0.5x} \end{aligned}$$

$$\begin{aligned} x_{i+1} &= x_i - \frac{f(x_i)}{f'(x_i)} \\ &= x_i - \frac{e^{-0.5x_i} (4-x_i) - 2}{(-3+0.5x_i)e^{-0.5x_i}} \end{aligned}$$

Initial guess value of 0.5

$$\begin{aligned} x_{i+1} &= 0.5 - \frac{e^{-0.5(0.5)} (4-0.5) - 2}{(-3+0.5(0.5))e^{-0.5(0.5)}} \\ &= 0.83889 \end{aligned}$$

when $x_i = 0.83889$

$$\begin{aligned} x_{i+1} &= 0.83889 - \frac{e^{-0.5(0.83889)} (4-0.83889) - 2}{(-3+0.5(0.83889))e^{-0.5(0.83889)}} \\ &= 0.546065 = 0.88496 \end{aligned}$$

when $x_i = 0.546065$

$$x_{i+1} = 0.546065 - \frac{e^{-0.5(0.88496)} (4-0.88496) - 2}{(-3+0.5(0.88496))e^{-0.5(0.88496)}}$$

$$= 0.885709$$

i	X_{i+1}	E_a
0	0.5	0
1	0.83889	40.39747299
2	0.88496	5.205388089
3	0.8857086071	0.08497204
4	0.885708802	2.22468558
5	0.885708802	1.52925215