

JABOERWE KENENNA

16/ENAO3/031

Civil ENGINEERING

ENG 382

ASSIGNMENT (2)

Solution

a) $f(x) = e^{-0.6x} (4-x) - 2$

$f'(x) \rightarrow$

let $u = e^{-0.6x}$, $v = (4-x)$

$du = -0.6e^{-0.6x}$, $dv = -1$

$f'(x) = -e^{-0.6x} - 0.6e^{-0.6x} (4-x)$

$x_0 = 0.5$ [Initial guess]

General Newton-Raphson's formula

$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

$f(x_0) = f(0.5) = 0.7258027407$

$f'(x_0) = f'(0.5) = -2.14702153$

root 1 $\Rightarrow x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 0.8388906061$

$f(x_1) = 0.07814929779$

$f'(x_1) = -1.696486032$

root 2 $\Rightarrow x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = 0.884956003$

~~$f(x_2) = 3.23583557 \times 10^{-7}$~~ $f(x_2) = 1.236075203 \times 10^{-3}$

~~$f'(x_2) = -1.642200929$~~ $f'(x_2) = -1.643060762$

root 3 $\Rightarrow x_3 = x_2 - \frac{f(x_2)}{f'(x_2)} = 0.885708005$

$f(x_3) = 3.23583557 \times 10^{-7}$

$f'(x_3) = -1.642200929$

root 4 $\Rightarrow x_4 = x_3 - \frac{f(x_3)}{f'(x_3)} = 0.885708802$

$f(x_4) = 7.845 \times 10^{-2}$

$f'(x_4) = -1.64220704$

$x_5 = x_4 - \frac{f(x_4)}{f'(x_4)} = 0.885708802$

$\therefore 0.885708802$ is the root of the eqn (1.1)