

Problem 3  
 Given function  $f(x)$   
 $1.6 \times 10^{-5}$   
 for 382  
 300 level, level 285

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

$$x_0 = 0.5$$

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

$$f'(x)$$

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

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

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

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

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

At  $x_0 = 0.5$

i	$x_i$	$f_i$
0	0.5	0
1	0.83889058	
2	0.8849560	
3	0.88570861	
4	0.88570861	
5	0.88570861	

at  $x_0 = 0.5$

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

$$f(x_0) = 0.7258027$$

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

$$f'(x_0) = -2.1417022$$

$x_1$

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

$$x_1 = 0.83889058$$

$$x_1 = 0.83889058$$



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

$$f(x_1) = e^{-0.5(0.83887058)} (4 - 0.83887058)$$

$$f(x_1) = 0.07814734$$

$$f'(x) = e^{-0.83887058} - 0.5e^{-0.5(0.83887058)} (4 - 0.83887058)$$

$$f'(x) = -1.6964841$$

$$x_2 = 0.83887058 - \frac{0.07814734}{-1.6964841}$$

$$x_2 = \underline{0.8849560}$$

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

$$f(x_2) = 0.001236579$$

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

$$f'(x_2) = -1.643061$$

$$x_3 = 0.8849560 - \frac{0.001236579}{-1.643061}$$

$$x_3 = 0.88570861$$

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

$$f(x_3) = 3.204469 \times 10^{-7}$$

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

$$f'(x_3) = -1.642201$$

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

$$x_4 = \underline{0.8857088051}$$

$$f(x_4) = e^{-0.5(0.8857088051)} (4 - 0.8857088051) - 2$$

$$f(x_4) = -5.082976 \times 10^{-7}$$

$$f'(x_4) = -e^{-0.5(0.8857088051)} - 0.5e^{-0.5(0.8857088051)} (4 - 0.8857088051)$$

$$f'(x_4) = -1.645164224$$

$$x_5 = 0.8857088051 - \frac{-5.082976 \times 10^{-7}}{-1.645164224}$$

$$x_5 = \underline{0.885708802}$$