

Assignment 2

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

$$x_i = 0.5$$

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$$

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

$$u = e^{-0.5x}$$

$$v = 4-x$$

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

$$f'(x) = e^{-0.5x}(-1) + (-0.5e^{-0.5x})(4-x)$$

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

$$\text{at } x_0 = 0.5$$

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

$$f(x_0) = 0.7258029$$

$$f(x_0) \approx 0.73$$

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

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

$$x_1 = 0.5 - \frac{0.73}{-2.142}$$

$$x_1 = 0.84$$

$$f(x_1) = e^{-0.5(0.853887058)}(4-0.853887058) - 2$$

$$f(x_1) = 0.07814934$$

$$f'(x_1) = -e^{-0.5(0.853887058)} - 0.5e^{-0.5(0.853887058)}(4-0.853887058)$$

$$f'(x_1) = -1.6964861$$

$$x_2 = 0.853887058 - \frac{0.07814934}{-1.6964861}$$

$$x_2 = 0.885$$

f_i

f'_i

x_i

x

f_0

f'_0

f'_0

f'_0

x_1

x_1

M_0

func

$x_0 = 1$

max 1:

tol = 0

iter = 2

$f_2 = 0$

$$f(x_2) = e^{-0.5(0.885)} (4 - 0.885) - 2$$

$$f(x_2) = 0.001237$$

$$f'(x_2) = -e^{-0.5(0.885)} - 0.5e^{-0.5(0.885)} (4 - 0.885)$$

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

$$x_3 = 0.885 - \frac{0.001237}{-1.643061}$$

$$x_3 = 0.8857$$

$$f(x_3) = e^{-0.5(0.8857)} (4 - 0.8857) - 2$$

$$f(x_3) = 3.254469 \times 10^{-7}$$

$$f'(x_3) = -e^{-0.5(0.8857)} - 0.5e^{-0.5(0.8857)} (4 - 0.8857)$$

$$f'(x_3) = -1.642209$$

$$x_4 = 0.88570861 - \frac{3.254469 \times 10^{-7}}{-1.642209}$$

$$x_4 = 0.885708851$$

$$f(x_4) = e^{-0.5(0.885708851)} (4 - 0.885708851) - 2$$

$$f(x_4) = -5.082976 \times 10^{-9}$$

$$f'(x_4) = -e^{-0.5(0.8857)} - 0.5e^{-0.5(0.8857)} (4 - 0.8857)$$

$$f'(x_4) = -1.643$$

$$x_5 = 0.8857 - \left(\frac{-5.082976 \times 10^{-9}}{-1.643} \right)$$

$$x_5 = 0.8857$$

Matlab

558) function [x, err, niter] = ass2(x0, maxIter, tol, [horz, vert])

$\alpha_0 = 0.5;$

maxIter = 100;

tol = 0.00000001;

iter = 1;

$f = \alpha(x) (\exp(-0.5 * x) * (4 - x)) - 2;$