İzmir Institute of Technology

Numerical Methods in Engineering

CE301

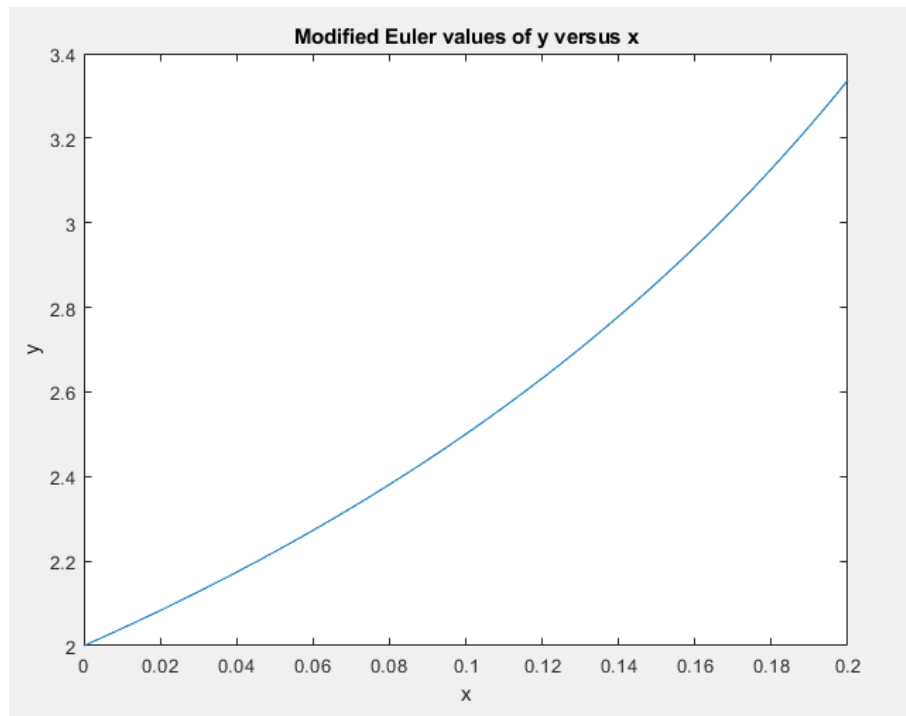**Assignment #4**

Section B

Mert Emrem - 250203015

Mechanical Engineering

Summer 2021

Ordinary differential equation given in the task is as follows:

$$\frac{dy(x)}{dx} = 0.5(1+x)y^2 \tag{1}$$

Code output is the following plot, with y values stored in a 1x3000 vector.

Appendix

A.1   Computer Code

```matlab
%%%%%%%%%%%%%%%%%%%%%     Mert Emrem - 250203015     %%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%     CE301 - Assignment #2       %%%%%%%%%%%%%%%%%%%%%

clc; clear all;

syms f(x) y

f(x) = 0.5*(1+x)*y^2;

[domain_l, domain_u, h] = deal(0, 0.2, 0.0001);

x = 0:h:domain_u;
y = [2];

segment_no = (domain_u-domain_l)/h;

for i = 1:segment_no

    y_p_next = y(i) + h*(x(i)^2 + y(i)^2);
    y_c_next = y(i) + 0.5*h*((x(i)^2+y(i)^2) + (x(i+1)^2+y_p_next^2));
    y = [y y_c_next];

end

plot(x,y)
title('Modified Euler values of y versus x')
xlabel('x')
ylabel('y')
```