

Question 3

Griffin Lehrer

$$y' - t + y = 0$$

$$y' = t - y$$

grid 1: $h = 0.5$ $y_0 = 2$ $t_0 = 0$

$$y_{n+1} = y_n + h f(t_n, y_n)$$

$$y_1 = 2 + 0.5(0 - 2)$$

$$y_1 = 2 - 1$$

$$y_1 = 1 \quad t_1 = 0.5 \quad h = 0.5$$

$$y_2 = 1 + 0.5(0.5 - 1)$$

$$y_2 = 1 + .25 - .5$$

$$y_2 = .75 \quad t_2 = 1 \quad h = 0.5$$

$$y_3 = .75 + 0.5(1 - .75)$$

$$y_3 = .75 + .5 - .375$$

$$y_3 = .875 \quad t_3 = 1.5 \quad h = 0.5$$

$$y_4 = .875 + 0.5(1.5 - .875)$$

$$y_4 = .875 + .75 - .4375$$

$$y_4 = 1.1875$$

grid 2: $h = 0.0625$ $y_0 = 2$ $t_0 = 0$

$$y_1 = 2 + 0.0625(0 - 2)$$

$$y_1 = 2 - 0.125$$

$$y_1 = 1.875 \quad t_1 = .0625 \quad h = 0.0625$$

$$y_2 = 1.875 + 0.0625(0.0625 - 1.875)$$

$$y_2 = 1.875 + 0.00390625 - 0.1171875$$

$$y_2 = 1.76171875 \quad t_2 = .125 \quad h = 0.0625$$

$$y_3 = 1.76171875 + 0.0625(.125 - 1.76171875)$$

$$y_3 = 1.76171875 + 0.0078125 - 0.110107421875$$

$$y_3 = 1.65935703125 \quad t_3 = 0.1875 \quad h = 0.0625$$

$$y_4 = 1.65935703125 + 0.0625(.1875 - 1.65935703125)$$

$$y_4 = 1.65935703125 + 0.01171875 - 0.103709814453125$$

$$y_4 = 1.567365966796875$$

Using Euler's method for function

$$y' = t - y \quad \text{is}$$

$$1.1875 \quad \text{when } h \text{ (step size)} = 0.5$$

and

$$1.567365966796875 \quad \text{when } h \text{ (step size) is } 0.0625$$