

Mathematics 172

Quiz #17

Name: _____

Key

You must show your work to get full credit.

For the initial value problem

$$x'(t) = x(t) + 2y(t)$$

$$x(0) = 1$$

$$y'(t) = x(t) - y(t)$$

$$y(0) = 2$$

used Euler's method to complete the following table

t	Approx. value of $x(t)$	Approx. value of $y(t)$
0.0	1.00	2.00
0.1	1.5 1pt	1.9 1pt
0.2	2.03 1pt	1.86 1pt

$$x'(0) = x(0) + 2y(0) = 1 + 2 \cdot 2 = 5$$

$$y'(0) = x(0) - y(0) = 1 - 2 = -1.$$

$$\text{so } x(0.1) \approx x(0) + x'(0)(0.1) = 1 + 5(0.1) = 1.5$$

$$y(0.1) \approx y(0) + y'(0)(0.1) = 2 + (-1)(0.1) = 1.9$$

$$x'(0.1) \approx x(0.1) + 2y(0.1) = 1.5 + 2(1.9) = 5.3$$

$$y'(0.1) \approx x(0.1) - y(0.1) = 1.5 - 1.9 = -0.4$$

so

$$x(0.2) \approx x(0.1) + x'(0.1)(0.1) = 1.5 + (5.3)(0.1) = 2.03$$

$$y(0.2) \approx y(0.1) + y'(0.1)(0.1) = 1.9 + (-0.4)(0.1) = 1.86$$