

Quiz 3

Consider the differential equation

$$y' = t + y$$

with initial condition $y(0) = 1$; let $y = \phi(t)$ be the solution.

Using the information above, approximate $\phi(0.1)$ using Euler's Method and the Improved Euler Method, both with step size $h = 0.1$. Show all work and write your final answer as a decimal number (i.e., do not simply leave it as a formula with values plugged in).

Euler

$$y(0.1) \approx y(0) + (0.1)y'(0) \quad (6PTS)$$

$$= y(0) + (0.1)(0+1) \quad 2PTS$$

$$= 1 + 0.1$$

$$\boxed{= 1.1} \quad 2PTS$$

Mod. Euler

$$y(0.1) \approx y(0) + (0.1) \left(\frac{y'(0) + y'(0.1)}{2} \right) \quad (1)$$

$$= 1 + (0.1) \left(\frac{2.2}{2} \right) \quad 2PTS \text{ per summand}$$

$$= 1 + (0.1)(1.1)$$

$$\boxed{= 1.11} \quad 2PTS$$