

1. Consider the initial value problem:

$$y' = y^3 + 1, \quad y(2) = 0.$$

a. Using Euler's method with 4 steps of equal size to estimate  $y(2.4)$ , what is the value of the step size  $h$ ? Answer: \_\_\_\_\_

b. Using Euler's method, estimate the value of  $y(2.4)$ . Fill in each of the steps that you should take below.

$$y(2.1) \approx$$

$$y(2.2) \approx$$

$$y(2.3) \approx$$

$$y(2.4) \approx$$

2. The number of cellphones (in millions) owned by the residents of a city is given by the equation

$$\frac{dy}{dt} = ye^{-t}; \quad y(0) = 1$$

where  $t$  is the time in years from 2008. Use Euler's method with **four equal steps** to estimate the number of cellphones owned in the year **2010**.

3. The number  $y(t)$ , **in thousands**, of pine trees  $t$  years after year 2000 in a 100 sq. miles region is approximately modeled by the differential equation:

$$\frac{dy}{dt} = 1 + t - 0.1y^2$$

Suppose the number of trees is 2 thousand in the year of 2002.

- a. What is the value of  $y(2)$ ? Answer: \_\_\_\_\_
- b. Using Euler's Method with  $\Delta t = 2$  estimate the number of trees in the region in the year of 2006.