

## §1.4 Euler's Method

**Goals**

- To be able to use Euler's method to find an approximate solution to an initial value problem.
- To understand that there are better algorithms than Euler's method.
- To understand that Taylor's Theorem theorem is a very useful tool for studying differential equations.
- To understand the error involved in approximating solutions to DEs and how we can bound error.

**To Prepare for Class on §1.4**

1. Read §1.4.1 Euler's Method
2. Verify that  $y(t) = 2e^t - t - 1$  is a solution to the initial value problem

$$\begin{aligned}y' &= y + t \\ y(0) &= 1.\end{aligned}$$

3. Given

$$\begin{aligned}y' &= y + t \\ y(0) &= 1,\end{aligned}$$

what is the slope of the tangent line to the solution curve at  $t = 0$ ?

4. Find the second-degree Taylor polynomial for the function  $f(x) = \sqrt{x^2 + 3}$  at the point  $x_0 = 1$ .