

# Euler's Method

## Introduction to Epidemiological Modeling

College of the Atlantic. April 7, 2023

Consider again the differential equation

$$\frac{dP}{dt} = f(P), \quad (1)$$

where  $f(P)$  is given by

$$f(P) = \frac{1}{10}P \left(1 - \frac{P}{200}\right). \quad (2)$$

The units of  $f(P)$  are people/day. We will assume that the initial population is 20 people.

1. Use Euler's method to determine an approximate solution to Eq. (1). Use  $\Delta t = 10$ . Find the solution up to  $t = 50$ , although if you are feeling energetic/motivated, find the solution up to  $t = 100$ .
2. Use Euler's method to determine an approximate solution to Eq. (1). Use  $\Delta t = 5$ . Find the solution up to  $t = 50$ , although if you are feeling energetic/motivated, find the solution up to  $t = 100$ .



Figure 1: A portrait of Leonhard Euler. (Image source: [https://en.wikipedia.org/wiki/File:Leonhard\\_Euler\\_-\\_edit1.jpg](https://en.wikipedia.org/wiki/File:Leonhard_Euler_-_edit1.jpg). Photograph of a painting by Jakob Emanuel Handmann. Photo by kunstmuseum basel, edited by wikipedia user Bammesk.)