# Logistic Equation Warm-Up

## Introduction to Epidemiological Modeling

### College of the Atlantic. April 7, 2023

Consider again the differential equation

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

where $f(P)$ is shown in the figure. We will only consider non-negative $P$.

1. Sketch a few representative[1][2] solutions $P(t)$ to Eq. (1).

2. A possible formula the $f(P)$ in Eq. (1) is:

$$f(P) = kP(1 - \frac{P}{K}) \,, \qquad (2)$$

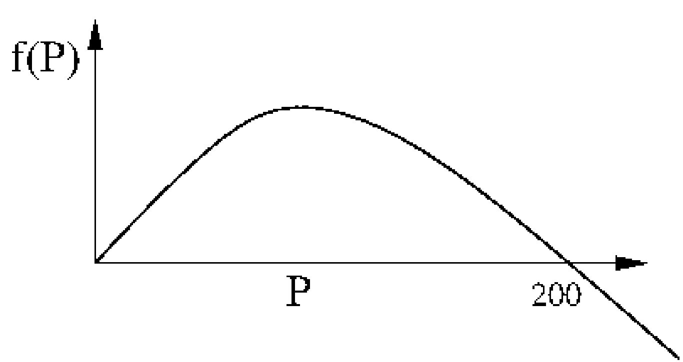
   where $K$ and $k$ are positive constants.

   (a) Convince yourself that the graph of Eq. (2) looks like the figure.

   (b) What is the practical meaning of $K$? If $K$ is doubled, how do the solutions $P(t)$ change?

   (c) What is the practical meaning of $k$? If $k$ is doubled, how do the solutions $P(t)$ change?

3. To what situation(s) might Eq. (1) apply?




[1] I.e., choose a few different initial conditions that, taken together, give an overview of the sorts of things solutions to the equation can do.

[2] This is the same thing we did in class on Tuesday.