

Class 07: More with Accumulated Change

Calculus II

College of the Atlantic. January 23, 2023

1. The plots in Fig. 1 show six different possible functions for $u(x)$, the rate of change of unicorn biomass, in units of kg/day.

- (a) For each $u(x)$ is the total accumulated change after ten days positive, zero, or negative?
- (b) Which graph has a greater accumulated change, D or E? Why?

2. Let $r(t)$ be the rate at which snow falls, in inches per hour, where t is measured in hours since midnight. What is the practical interpretation of the following equations?

$$r(8) = 1.2, \tag{1}$$

$$r'(8) = 0.2. \tag{2}$$

$$\int_6^{14} r(t) dt = 9.5. \tag{3}$$

What are the units of 1.2, 0.2, and 9.5?

3. Apple pie filling is leaking from a storage container. The rate $r(t)$ at which it is leaking is given by the function:

$$r(t) = \sqrt{4 - t^2}, \tag{4}$$

in units of metric tons per hour, and where t is measured in hours since the leak began. The leak lasts for two hours.

- (a) Write the total amount of apple pie filling that escapes as a definite integral.
- (b) Use left- and right-hand sums to estimate the value of the integral. You will want to do this on python. You can likely re-use your code from Thursday afternoon. See what happens as Δt gets closer and closer to zero.
- (c) Hmm. Why did you get the answer you did?

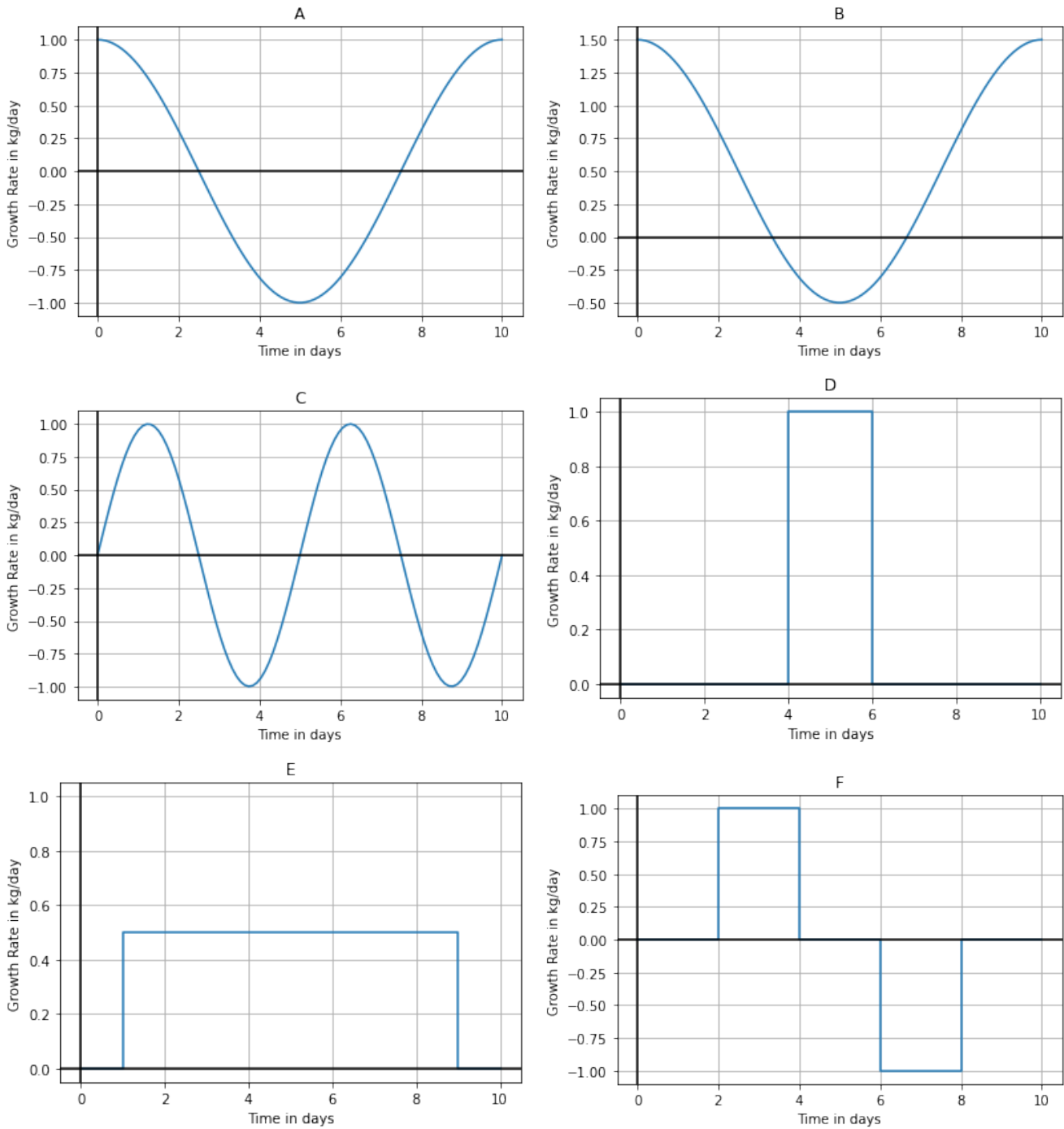


Figure 1: Six different rates of change of the biomass of unicorns.